WHAT IS INSTINCT ?

• C. BINGHAM NEWLAND •

Cornell University Library
Ithaca, New York

BOUGHT WITH THE INCOME OF THE
SAGE ENDOWMENT FUND

THE GIFT OF
HENRY W. SAGE

1891

Cornell University Library
arV13608

What is instinct?

3 1924 031 273 612
olin,anx

Cornell University Library

The original of this book is in
the Cornell University Library.

There are no known copyright restrictions in
the United States on the use of the text.

WHAT IS INSTINCT?

The appearance of a migration of shore-birds flying out of sight of land over the surface of the ocean is indeed significant of the infinite possibilities of nature, and ideally suggests "the Spirit of God moving upon the face of the waters" (p. 199). [Frontispiece.]

WHAT IS INSTINCT ?

SOME THOUGHTS ON TELEPATHY
AND SUBCONSCIOUSNESS IN ANIMALS

By C. BINGHAM NEWLAND

WITH ILLUSTRATIONS

NEW YORK :
FREDERICK A. STOKES COMPANY
PUBLISHERS

FOREWORD

A CONTRIBUTOR to the *Daily Mail*, writing on "the puzzle of the racing pigeon," says :

"Those who come to the conclusion that some innate knowledge of direction is the main factor simply use an expression calculated to hide ignorance. They remind one of the ostrich with its head in the sand."

The contents of this book may perhaps suggest what that "innate knowledge" is, and whence derived.

In writing of the creatures of the Animal World I have, with few exceptions, described their habits and doings entirely from personal observations which cover many years close study in the field.

As sportsman and naturalist I have had exceptional opportunities for observing nature under all sorts of conditions, and although I lay no claim to deep scientific learning, I have been so impressed with what I have seen that I am constrained, in the interests of science, to submit the following observations for what

they are worth, in the hope that they may prove suggestive and that those possessing scientific knowledge may give their attention to the proposition set forth, and perhaps follow up my theory on more systematic lines.

However, putting aside the scientific aspect of the case, I have every hope that these essays on Natural History, written in a popular form, will prove acceptable to all those who take an interest in the doings and wonderful achievements of creatures of the Animal Kingdom.

C. B. N.

CONTENTS

	PAGE
CHAPTER I - - -	I
Telepathy—Subconscious influences: humanity— Subconscious mind rules exclusively in the Animal World—Subconscious faculties inherited from primæval ancestors—Water-divining—Dog's power of "scenting."	
CHAPTER II	5
Convictions from practical study of nature—What we understand by nature—Nature compared to a machine—Invisible links—Review of creatures in the Animal World—Nature's schemes for self-protection— Creatures devoid of self-consciousness—Infallibility of subconscious mind where there is no question of reasoning powers: Lepidoptera—Metamorphosis of Cabbage-White—Epitome of life-history of White- Admiral.	
CHAPTER III -	14
Puss-moth—Cocoon of puss-moth—Section of cocoon —Parthenogenesis—Cocoon of Emperor moth.	
CHAPTER IV - -	20
Ichneumon-flies—Rhyssa persuasoria—Ichneumons, parasitic on larvæ of other insects—Sirex gigas—Tremu- lous antennæ: ichneumons—Ovipositor in action— Sirex larva—Antennæ: specialized—Nature's intangible connections—Life-principle: centre of subconsciousness.	

	PAGE
CHAPTER V	26
Blending of subconscious mind—Ants: sense of direction—Bees and wasps: sense of direction—Souls of animals—"Group-souls"—Zone of telepathy—Processionary caterpillars: habits illustrative of mind-blending.	
CHAPTER VI	32
Review of Processionary caterpillars—Actions of animals due to infallible subconscious mind—Difference between reasoning and subconscious mind—Subconscious mind, pure expression of All-Mind—Illustration: spider's web—Community of processionary caterpillars: example of "Nature in her Divine purity"—Experiment by Fabre (French naturalist)—Meddling with nature's arrangements—Silken thread: guide to nest—Buff-Tip: larvæ—Small Eggar moth: larvæ—Colonizing of <i>Melitæa aurinia</i> —Ermine moth—Gregarious larvæ of saw-flies: examples of mind blending.	
CHAPTER VII	40
Blackbird and Thrush—Willow-Warbler and Wood-Warbler—Spontaneous knowledge—Water Ousel—Crowned Hornbill—Nuthatch—Long-tailed Tit—Golden-crested Wren—Golden Oriole—Pensile nests—Pigeon's nests—Rock Dove—Stock Dove—Ring Dove—Magpie—Firewood-Gatherer.	
CHAPTER VIII	49
Wild-Duck—Shell-Duck—Colours and markings on birds' eggs—Hedge-Sparrow's egg—Guillemots—Modification of guillemot's egg—Eggs of plovers, woodcock, etc.—Position of eggs in nest.	
CHAPTER IX	56
Bird aware of addled egg—Pied-Flycatcher: personal incident—A revelation in natural history—Birds and others removing their belongings—The Cuckoo's case.	

CONTENTS

ix

CHAPTER X	- - - - -	PAGE 62
-----------	-----------	------------

The power of flight—The aeroplane—Flying, natural to the bird as the act of walking is to man—Chicks of game birds—Birds teaching their young to fly (?)—Cygnets learning to fly (?)—Swans and surroundings—Swans: "Exposers"—Birds' means of identifying one another—In telepathic union—Telepathy not essential: humanity—Telepathy essential: animal world—Telepathy, capacity for responding to vibration under sympathetic action—Sympathy, the one great power throughout nature—Wings of birds structurally alike—Wing of bird, best possible design.

CHAPTER XI		71
------------	--	----

Flight of birds: characteristic—Wing action: same in all birds—Observing flight from different points of view—Heron: slow mover—Rook, lapwing, gulls: birds of slow flight—Flight of black-headed gull—Flight of pigeons—Summer-Snipe: characteristic flight of sandpipers—Anatomy of bird's wing—Spur-winged plover—Feathering of the wing: valve principle—Up-and-down action of the wing—How a bird rises from the ground—Progression through the air—Undulating flight—Flying on a level plane—Undulating flight of small birds—Woodpeckers: exponents of undulating flight—Green woodpecker—"Coasting": applied to bird-flight—Partridges "coasting"—Nature as she is—Wings act as brake against the air.

CHAPTER XII	-	86
-------------	---	----

Insect flight—Construction of the wing: insects—Coleoptera: jointed wing—Bombylius, humming-birds and hover-flies—Flying backwards—Hawk-moths.

CHAPTER XIII	- -	92
--------------	-----	----

Sounds in nature—Few creatures incapable of utterance—Jack-Snipe—Sounds that convey meanings—Songs of birds—Glance "behind the veil"—Instrumental music—Antennæ, organs for intercepting sound—Woodpeckers using a sounding-board—"Bleating" of snipe—Corncrake and Nightjar: personal note—Antics of birds—Subconscious manifestation.

CHAPTER XIV PAGE
99

Natural protections—Exposers and Concealers—Wild Duck—Curlew, golden-plover and shore-birds—Attitude of creatures on the approach of danger—Company movements of birds and others—No leaders in true sense of the meaning—Birds flying in V-shaped figure—Flock of birds actuated by one mind—Mind-blending : explanation—Birds fall automatically into "wedge" shape—Geese (*Anser albifrons*)—Golden-Plover over feeding grounds—In nature, nothing impossible—Bird aristocracy—Stints, dunlin, sandlings and ringed-plover—Telepathy, general throughout Animal World—Rooks : Exposers—Starlings.

CHAPTER XV - 110

Concealers—Covey of partridges—All birds in the covey rise simultaneously—Laggards, outside zone of telepathy—Partridges dwell together in close association—"Packing" of coveys—Attitude of concealment helped out by colour resemblance to surroundings—Mind-blending : gregarious animals—Sheep—Sheep, crowding together—Stampede of horses and panic in human crowd—"Psychology of crowds."

CHAPTER XVI 117

Quick response of subconscious mind—Movements, characteristic of creatures—Thrush : example—Freaks and deformities—Hereditary disease not possible in pure nature—Birds dependent on senses of sight and hearing—Eyes of birds, specially modified—Bird's vision includes all-round view—Angle of parallax—Woodcock, snipe, etc., position of eye-sockets—Equilibrium.

CHAPTER XVII 126

Animal instinct discredited—Quotation from *Daily Mail*—Pigeon racing, national sport—"Homing" instinct manifested throughout Animal World—Calf's sense of direction : an incident—Pigeons : is training necessary?—Effect of fog on pigeons—Telæsthesia.

CONTENTS

xi

	PAGE
CHAPTER XVIII	- 134

Sense of direction—Frogs and toads—Fresh-water eel—Eels supposed to originate from horsehairs—*Gordius aquaticus*—Migration of eels—Eels' sense of direction—Eel, a sea-fish.

CHAPTER XIX	- 139
-------------	-------

History of the salmon—Salmon, a river fish—Relationship of salmon and trout—"Slob" trout—Proof of relationship between salmon and trout—Hybrids—Fresh water essential to hatching and maintaining young salmon (parr)—Similarity of appearance between young salmon and trout—Why should salmon be attracted by the baits and lures of the angler?

CHAPTER XX	- 144
------------	-------

Salmon rising to artificial fly—Fish controlled by subconscious principle—Angler takes advantage of salmon's incapacity for reflection—Creatures' innate sense of curiosity—Duck decoy—Dog used to attract the birds—Sense of curiosity in birds—Animals become accustomed to innovations—Horse, a timid creature—Elephant—Horse and rider in telepathic sympathy—Horse prone to shy at unnatural objects—Senses of fear and curiosity in some way connected.

CHAPTER XXI	- 152
-------------	-------

Creatures attracted by unnatural appearances—Curiosity aroused in cattle—Skylarks attracted by prismatic mirror—Animals fascinated by light—Salmon attracted by light—Salmon problem—Deluding trout, no mystery.

CHAPTER XXII	- 156
--------------	-------

Salmon fishing, psychological point of view—Salmon fly—"Snow fly"—"Jock Scott," all-round fly—"Warning colours"—Salmon attracted by curiosity—Salmon enter fresh water for breeding purposes only—Oxygen, necessary to salmon—Æstivation of salmon.

	PAGE
CHAPTER XXIII - - -	166
<p>Salmon æstivating : personal experience—Futility of casting over salmon when in state of æstivation—Rise in the water awakens the fish—The kelt—Real baits used by the angler—The worm as bait for salmon—The prawn—Spinning baits—Live bait for salmon—Mind-blending : fish—Psychological aspect.</p>	
CHAPTER XXIV - - -	176
<p>Hive-bees : an exception—Swarming of bees—The queen bee—Quotation (Myers)—Bee Scouts—Bees "sense" a cavity—Humble-bees : a practical test.</p>	
CHAPTER XXV	187
<p>Telæsthesia—Migration of birds—Willow-Warbler—Telæsthesia : manifested in man—Telæsthesia enables birds to find their way—Man and the magnetic compass—Nature : a vast machine—Circle : emblem of eternity—Nature works on cyclic system—Migrations at night—Birds attracted by lighthouse—Functioning of bird's subconscious mind.</p>	
CHAPTER XXVI	195
<p>Migrations—Swallows—Birds travelling at night—Psychological moment of departure—Wind, factor in controlling migrations—Effect of cold and starvation on birds—Birds travel without thought of losing the way—Sand-Grouse.</p>	
CHAPTER XXVII	200
<p>Mr. Hutchinson's account in <i>Cornhill</i> (the <i>Globe</i>), re distribution of birds in connection with the war—Note, and excerpt from account written by officer at the front (<i>The Times</i>, March, 1916).</p>	

CONTENTS

xiii

	PAGE
CHAPTER XXVIII	204

Author's endeavour to show how birds and others accomplish their "remarkable feats"—Dog swims subconsciously—Man learns to swim—Reasoning and subconscious mind, connected—Effects of the war on pheasants—Polygamous birds—"Crowing" and "wing drumming"—Effects of sound on gallinaceous birds—Pheasant cocks : erectile ear-covers.

CHAPTER XXIX	210
--------------	-----

Review of the evidence—Subconscious mind integral of All-Mind—Infallibility of subconscious mind—Nature knows without reasoning—Too long in the old tracks—Bird-like flying machines—Nature linked together and moved by the One Spirit—Quotation from Pope.

LIST OF ILLUSTRATIONS

FRONTISPIECE

SECTIONS OF PUSS-MOTH COCOON	- <i>facing page</i>	16
COCOON AND SECTION (EMPEROR-MOTH)	„ „	16
RHYSSA PERSUASORIA DEPOSITING		
OVUM IN LARVA OF SIREX GIGAS -	„ „	22
SIREX GIGAS	„ „	22
NEST OF WILLOW-WARBLER -	„ „	41
NEST OF LONG-TAILED TIT	„ „	44
NEST OF GOLDEN-CRESTED REGULUS	„ „	45
NEST OF BLACKBIRD - -	„ „	48
NEST OF HEDGE-SPARROW	„ „	50
EGG OF GUILLEMOT (URIA TROILE)	„ „	52
LARVAE OF SAW-FLY ON POPLAR LEAF-	„ „	52
NEST OF LESSER WHITETHROAT	„ „	70
WING OF BIRD -	„ „	88
BOMBYLIUS (DIPTEROUS FLY) -	„ „	88
NEST OF THRUSH	„ „	116
HEAD OF PHEASANT - -	„ „	122
HEAD OF WOODCOCK - -	„ „	122

*God is spirit—personal and self-conscious in man:
Nature in her Divine purity is the image of Deity.*

E. P. PRENTICE.

WHAT IS INSTINCT?

CHAPTER I

TELEPATHY

IN these days, when all things seem possible, it may be that telepathy, now recognized by science, will be turned to practical account by some mechanical means. Already we have that inestimable boon to humanity, the Marconi wireless system, which is no less than a material apparatus tuned to transmit and receive the intangible through space.

Our present knowledge of telepathy is slight and of no practical use, for the faculty can rarely be commanded at will, and seems to occur only among those abnormally susceptible to subconscious impressions.

Amongst a given number of persons there is always a proportion of those who, in some form or another, are more or less sensitive to subconscious influences. In most cases their powers have not been developed, and in many are unsuspected by the persons possessing them.

This is the case of humanity, but throughout the Animal World I believe the subconscious mind rules exclusively, otherwise there could be no purposeful manifestations, or even existence, on a plane where there is no self-conscious reasoning mind.

Before the dawn of human intelligence Nature reigned in all her purity, and in realms where personal intelligence is not she still continues to take the helm with no uncertain hand. Of this I shall endeavour to show. In the meanwhile, it should be noted that persons having subliminal tendencies are generally described as "gifted." One has the gift of clairvoyance; another the gift of psychometry; whilst a third is endowed with the power of water-finding (divining) and so on. However, I think these manifestations should not be considered in the light of special gifts, but rather as fitful recurrences of faculties prevailing in times before the evolution of self-conscious mind, and in which heredity takes part.

These "gifted" persons are commonly looked upon with suspicion, and by some are said to have supernatural powers. Their powers are supernormal, but not supernatural; on the contrary, I believe they are entirely natural, but have become atrophied and out

of date in the face of growing intelligence which has superseded them. Analogous faculties when manifested in animals are vaguely described as "instinct."

In the case of water-divining, if not actually regarded as an impostor, the sensitive, armed with his wand, is held as some kind of magician, no great faith being attached to his predictions. Nevertheless, his "gift" is very real and very ancient, probably dating from a savage ancestry, men or ape-like creatures with practically no intelligence ; inhabitants, they may have been, of arid tracts where surface-water was scarce or non-existent.

Water, however, was a necessity of life, and the only means these creatures had of discovering it was by instinctive mind. Thus, we may suppose, this subconscious faculty prompted them to "sense" the ground until a certain influence affecting them was felt, when they would be led to scoop out a hollow into which the water would percolate.

A somewhat parallel case will show that such a theory is not improbable. For instance, intelligent man has no power to detect truffles under ground. The most he can do, using his wits, is to dig to a certain depth which he *knows* in places he *thinks* likely. If any success attends this *method* it is entirely due

4 DOG'S POWER OF "SCENTING"

to chance. But a dog or other animal (pig, badger, etc.) is seen to sense the ground, and soon discovers the exact spot where the esculent lies hidden below the surface. It may be said that this is only a matter of smelling (scenting). It is true the dog's nose is the organ by which the presence of game, etc., is made known to him ; but of the actual sensations he experiences we have no knowledge. The smallest game-bird, a jack snipe, when held in the hand, has no appreciable smell for us, but the dog is aware of it when fifty yards distant. The dog also is capable of running on the tracks of his master, and following him through streets where the scent is foiled by the trampling of many human, leather-clad feet. If these performances are due to the sense of smell they transcend anything we understand of that faculty.

The stock from which man descended probably never possessed this power, it being unnecessary to the particular habit of life ; hence no trace of it has been handed down.

CHAPTER II

WHAT WE UNDERSTAND BY NATURE

IN the following pages I shall submit for the reader's consideration convictions which have been impressed on my mind from the practical study of nature—observations in the field.

First, however, it may be well to consider what we understand by nature. The word is derived from the Latin : *natus*, born ; therefore, nature has a prior cause—a parent. But when we consider that nature is the sum of all things visible, and much which, though invisible to normal sight, is in other ways perceptible, we come to the inevitable conclusion that what stands *in loco parentis* to nature is the First Cause, and this brings us to a contemplation of the Absolute—the Absolute Infinite Mind which is at the back of, and reflects through, all nature.

As the differential wheels of a clock are accurately fashioned and intermeshed to ensure perfect time-keeping and regularity of

6 NATURE COMPARED TO A MACHINE

the mechanism, so, in nature, we find wheels within wheels—a continuous interaction of innumerable parts all contributing to the orderly functioning of the whole system which, like the clock, works with the utmost precision. In both cases there is the power—Life, and consequently movement. In nature's instance, though we cannot investigate the "mainspring," it is always open to us to study the "works" and endeavour to fit them together as pieces of a mighty puzzle. As these pieces fall into their places they are found to correspond perfectly ; when gaps appear it is only that we have failed in adjusting the parts. The fitting together of this puzzle becomes complicated when dealing with nature's intangible connections, for though these links are invisible they are none the less real and essential to the movements of nature's machinery.

A review of the habits and performances of some of the creatures of the Animal World will, I think, show that the seen and the unseen are closely connected.

In the so-called lower creation, we note that creatures living independently of man are, for the most part, wild and shy, particularly as regards man. The reason for this is, of course, that danger menaces them on all sides : they

live in constant peril of their lives, and man is not their least enemy. But nature has a variety of wonderful schemes for self-protection. I say *self*-protection, because my belief is that life devoid of self-consciousness is the *pure* expression of Omniscience. Were the creatures self-conscious they would reason for themselves, and in consequence be liable to err. But they make no mistakes, as will be seen, because they are governed entirely by instinctive mind, which is the subconscious principle directly transmitted from the "main-spring"—All-Mind. For this reason the subconscious principle in animals and all living things is infallible—infallible in so far as relates to the imminent necessities of the creatures, whatsoever. Untrammelled by any process of reasoning, the subconscious mind makes no mistakes, requires no mental exercise, and is *never forgetful*. This mind is responsible for all internal functions, circulation, respiration, etc., of the organism, besides controlling external movements and manifestations (animals).

Now we shall observe how this mind functions on a plane where there can be no question of reasoning powers. For instance, we will consider the life of a lepidopteron (butterfly), which undergoes a series of changes

8 THE CABBAGE-WHITE BUTTERFLY

of form. The Cabbage-White (*Pieris brassicæ*) will serve as example.

Those who have witnessed the metamorphoses of this or other lepidopterous insects, must have been struck by the seemingly perfect knowledge manifested by this creature, not only that an event is due, but that it is necessary to make preparations beforehand. Thus we observe the larva when full fed, leave its food-plant and start off over the ground with evidently a determined purpose, which is, in fact, to discover a suitable place for pupation. Should there be a wall in the neighbourhood the caterpillar, though possessing no physical sight, is sure to find it and climb to the first ledge or coping, a place exactly suited to its requirements. After determining the right spot the larva spins a pad of silk which affords a good holding for the anal claspers (last pair of legs) for the time being ; but later on it will be seen that this act was an absolutely necessary precaution. In the meanwhile, it rests quietly whilst certain changes are in process within. After some days in this position, a final touch to the arrangements is added. Raising its head and anterior segments, the caterpillar stretches backwards and with extreme adroitness weaves a silk cord, composed of several strands, trans-

versely over its body, the ends on either side being attached to the wall. This done, there is again a period of inactivity during which the anterior segments behind the head are seen to thicken and swell out.

The first sign that the metamorphosis is about to take place (the change is effected in a few minutes) is the splitting of the skin on the top of the enlarged segments. As the split opens out, the larval skin falls away and shrivels at the sides. At this juncture the process is somewhat impeded by the silken ligature already described ; but the creature is equal to the occasion. With spasmodic contortions of the body it succeeds in freeing itself of the slough which, still in a piece, is worked down to the anal claspers which, in their turn, are shed with it. But at this critical moment the caterpillar exerts a final effort, hooking its tail into the *pad* by means of minute hooks which have taken the place of the cast-off claspers. Thus what once was a cylindrical body clinging by legs to a wall is now fusiform, legless and helpless, though perfectly secure save for outside interference.

The Cabbage-White is known as a double-brooded species ; which means that during a favourable season there will be a succession of broods, two or more, who quickly pass through

all stages till the coming of autumn, when the chrysalis must hybernate as such, or the race become extinct. Though the number of broods during the summer depends to some extent on weather conditions, the matter cannot be left to chance at the end of the season, when further development of the pupa must be arrested in order that it may survive the winter months. We note the duration of the pupal period varies, say, from twenty days to six months. It is apparent, therefore, that this period is not subject to the variable conditions of the weather, but is surely ruled by subconscious mind which times the working of nature's machinery down to the smallest detail.

Though all lepidoptera undergo the same changes, each class has different schemes for protection, and habits adapted to the nature of its surroundings. I have described the proceedings of the Cabbage-White because it is an insect that anyone may study ; but there are others who show, what appears to be, even greater *foresight*. The White Admiral (*Limenitis sibylla*) is notably one of these. Comparatively rare, and seeing the risks it incurs, the marvel is that this butterfly exists at all.

I give an epitome of this insect's life-history, as it bears strongly on the subject.

The butterfly emerges in June ; from the end of that month to the middle of July (roughly) the egg is laid on honeysuckle. The larva hatches in July and feeds up slowly until the honeysuckle leaves are about to fall. By this time the creature has only attained about one-third or less of its full size. But as winter is approaching it must needs prepare accordingly. Judging the time to a nicety, this minute creature stops feeding, and after selecting a suitable leaf proceeds to make a shelter for itself by pulling over the edge of the leaf and rolling it up by means of silken stays. But before taking up residence in the hibernaculum (and this is the point to which I would draw attention) the caterpillar travels up the stem and deliberately *splices the joint* with silk. The intention of this act is obvious. When the leaf falls from the plant, this particular leaf *does not fall* but remains *in situ* throughout the winter, where faded and shrunken it appears no more than a fragment of dead leaf, here and there, which has become entangled in spider's web. Nevertheless, there hangs a precious casket containing the time-being representative of one of the most beautiful British butterflies ; certainly the one displaying the most exquisite form of flight. The act of binding the stem of the leaf to the

living wood of the bush (which in a human would point to a knowledge of dendrology) ensures a double purpose ; for not only does the suspended hammock shelter and keep the inmate out of harm's way, but when spring returns the larva wakes to find itself in the midst of a plentiful food supply. Were this precautionary measure forgotten or omitted for a single season, it would mean the extinction of a species which has probably been extant for 20,000 years.

The man in the street may say it is a case of "blind instinct," and perhaps describe it as the "manifestations of a maggot" ; but to the thinking mind there underlies a profound psychological truth.

Creatures in the insect world, at all events, can learn nothing from practice, for they grow so quickly and are so short-lived that there is no time for mistakes which can only occur accidentally ; a mistake means the sure extinction of the individual. Then again, the changing from one state to another necessitates a fresh sequence of acts. Some of these, as we have seen, are never repeated ; therefore it is clear that what these creatures accomplish is not by means of acquired knowledge.

In pure nature, by which I mean life

functioning free from man's influence, elaborate schemes are seen to work out with the utmost punctuality and precision. The creatures involved make no tentative experiments, but the perception of how and when to act comes to them subconsciously. In the old-time phrase we say, they do these things "instinctively," which conveys little meaning; but to say the creatures act subconsciously infers mind, though mind of an impersonal nature. What indeed instigates the creatures is mind of the highest order. Purposeful acts cannot possibly eventuate without mind. Where, then, is the seat of this mentality? We can only assume it is *everywhere*—omnipresent and therefore Omniscient.

CHAPTER III

THE PUSS-MOTH

THERE occur to me two instances which show wonderful subconscious *foresight* in insects. The first refers to a well-known species, the "Puss" moth, as it is commonly called, (*Dicranura vinula*). The larva of this moth is a great favourite with young collectors, no doubt on account of its wonderful colouring and unusual form, and also because it possesses a unique (to the genus) caudal apparatus which comes into use when the larva is attacked by ichneumon-flies, to whose attentions it is much subject. The defence consists of two slender whip-like processes which are projected at will and flourished about over its body when the caterpillar is attacked by the flies, or even when disturbed by the human presence. The "puss" larva is altogether a fascinating creature, and interesting to watch throughout its larval existence; but it is the larva-pupal change to which I shall confine my description.

When full fed, on either willow or poplar, the larva begins to lose its bright colouring, which is a certain sign that the change is about to be made. This applies to all lepidopterous larvæ. Leaving the foliage, the caterpillar follows along the branch to its junction with the stem of the tree, and so crawls downwards. When the poplar is slender and not suitable to requirements, it proceeds over the ground to another spot ; but if the trunk of the original tree is large and the bark rough and uneven, there is no need to go further. Selecting a cavity amidst the excoriations of the bark, the creature proceeds to fashion the hollow to take the form of its body ; this it does by means of its powerful mandibles. After the cavity has been duly rounded off and smoothed down, the larva commences to spin a roof, at the same time chipping off bits of bark which amalgamate with the viscous thread as it issues from the spinnerets. By degrees the roof under construction becomes more and more opaque until the worker is no longer visible ; the work, however, continues, for this shell-like protection must be rendered air-tight and waterproof and of such a consistency that nothing may penetrate. As a matter of fact, this cocoon is as hard as cement, and being formed chiefly from the

bark of the tree itself looks exactly like a natural excrescence which only the practised eye of the entomologist can detect. By-and-by the larva pupates, an operation that involves the shedding of its skin together with the *cutting mandibles*. How, then, is it possible for the soft woolly moth, due to emerge the following spring, to break through the walls of its prison? Save for a short proboscis and antennæ it has then no tools to work with.

To understand how the moth escapes and the *modus operandi*, we must carefully cut out a cocoon with a chisel and extract the chrysalis ; then by holding to the light the empty shell, which looks like the half of an almond shell, it will be seen that the interior is opaque with the exception of a small circular cap at the top end ; this, it will be noted, has less bark and is *transparent*, otherwise as hard as the rest of the structure. This glazy "sky-light" is pure consolidated gum (liquid silk) which is spread by the larva as it finishes work. The consistency of the cement is such as to be unaffected by moisture, but is solvent to an alkaline fluid with which the moth is provided and which it exudes when breaking through the chrysalis case ; thus the gum gives way and the insect struggles through the aperture,

COCOON AND SECTION, EMPEROR-MOTH.

SECTIONS OF PUSS-MOTH COCOON.

[Facing page 16.]

a sorry looking object until its wings have developed and stiffened.

We ask ourselves, how, when plastering in the "skylight," does the caterpillar *know* to keep it practically free from bark, not entirely because there is a slight sprinkling of scraps on the *outer* surface which is evidently intended to make the structure look uniform in colour and general appearance? and why should it take these precautions when, at the time, it possesses jaws capable of cutting through any part of the structure? These are questions which cannot be answered except on the understanding of an Omniscient Mind manifesting *within*.

The next case is that of a very handsome insect : The Emperor-Moth (*Saturnia carpini*).

The cocoon of this species is of quite a different class : it may be looked for on moors. The larva, also a beautiful object, feeds on heather for the most part. When about to turn, it chooses a thick growth of the plant, where, amongst the topmost sprigs, it spins a flask-shaped cocoon. Though somewhat exposed in this position, it is easily overlooked on account of colour resemblance, and also from the fact that upstanding bents of dead melic-grass, common to moorlands, are often found drawn in and enmeshed, which help to

conceal it. Though yielding, these cocoons are extremely tough and durable, as they need to be to withstand the winter months in an exposed situation ; the collector, therefore, oftener than not, is disappointed on finding an old and empty case. But even this will serve for investigation purposes, which, after all, is what the true naturalist is out for rather than the senseless object of making a mere collection of things.

This moth, also, would be powerless to get out of the cocoon unless (as a larva) it had made certain arrangements in *anticipation* of the coming event. As I have said, the cocoon is flask-shaped and tapers to a blunt point where a few grass stems, interwoven, stick up above it. It is here, at the top, where eventually the moth emerges ; but to understand how the emergence is effected a sectional view will explain better than any words can describe.

To obtain a section, cut down an empty cocoon from the top to the base, dividing it into equal halves. For this purpose an ordinary pocket knife is of no use ; a lancet or some really sharp instrument must be employed, otherwise the part to be examined will be crushed out of shape. When the severance is neatly done, the "trick," so to speak, is

exposed. There will then be seen what, before it was cut, was a circular radiation of stiff resilient bristles sloping upwards and inwards until their ends meet and form a point. This extraordinary contrivance is on the system of an eel-pot, inverted.

It should be said that the web is produced, loosely diffused, above the bristles' point, so that if, by chance, anything—a small insect, for instance—penetrates this covering, still it cannot enter the inner chamber, for it would be held up in a kind of pocket which runs round at the base of the bristles. Thus it will be seen that no entrance to the interior from the outside is possible, but the inmate can with very little exertion push up and out through the practically unresisting bristles.

How the larva sets about such an elaborate device must, for obvious reasons, remain a mystery.

With regard to this species, it may be here worth recording that a case of parthenogenesis came under the writer's notice some few years ago, when a batch of ova deposited by an isolated female, bred in confinement, fully hatched out and were subsequently reared.

CHAPTER IV

ICHNEUMON-FLY (*RHYSSA PERSUASORIA*)

HAVING referred to ichneumon-flies I shall now give an account of one, typical of the class, whose subconscious manifestations are wonderful as they are interesting.

Ichneumonidæ, of which there are a great variety, include flies of all sizes from very minute creatures upwards. *Rhyssa persuasoria*, a four-winged powerful fly, has an elongated body of a blackish colour with yellowish lateral spots, and is the largest British representative of this class. The female has an ovipositor of surprising length which is often mistaken for a sting, but is really an egg-laying apparatus. If carefully examined, this instrument is seen to be split into three longitudinal sections. The centre process is the ovipositor proper, around which the two remaining hair-like sections close tightly, forming a protective sheath.

It must be understood that ichneumons in the larval stage are parasitic on larvæ of other

insects, some of which are wood-borers. Now the host of persuasoria is the larva of *Sirex gigas*, a very large saw-fly which, from its colour resemblance, has the appearance of a hornet. Like the ichneumon, it is also furnished with an ovipositor, short and stout, an appendage which adds greatly to its terrifying appearance. With this instrument the *Sirex* punctures the bark of fir-trees and deposits an egg on the living wood. On hatching, the grub eats its way into the tree and, by degrees, excavates a tunnel in the hard wood until nearly full fed, when it turns in an outward direction and bores at right angles until nothing but a thin partition remains between it and the outside. The creature then ceases work and prepares for pupation. In due course the saw-fly emerges, and pushing its way out is free to the world. This is what happens when all goes well with the *Sirex*. But though, apparently, so secure from outside interference, the *Sirex* larva has in persuasoria a deadly enemy, for this wonderful fly has the extraordinary power, not only of discovering the presence of its intended victim, but of locating the exact position occupied by the larva which, it must be noted, the ichneumon has never seen nor ever will see.

The ichneumon's proceedings are as follows : After alighting on the trunk of a fir-tree it runs actively up and down the bole, occasionally flying to a short distance and settling again to resume investigations. During this search the insect's antennæ are seen to be in a state of tremulous agitation. This hunt for the *Sirex* larva is an all-important matter, for on its success depends the continuity of the ichneumon race. *Persuasoria*, however, is equal to the situation. Presently she is seen to come to a standstill, and drawing up her legs plants herself firmly on the surface of the bark. In this posture she remains motionless with the exception of the antennæ which continue to beat the air. Now the ovipositor is directed backwards and bent round and over in a circular form until the extreme point rests on a spot immediately below the creature's abdomen. A drilling operation is then effected with the *naked* ovipositor, which, held in position by the tip of the sheath, begins to penetrate the wood, whilst the sheath, unaltered, preserves its curved form. The purpose of the divided sheath is now apparent, for as the ovipositor (drill) sinks deeper into the substance of the wood, its upper portion is seen to come away in loop-fashion from between the hair-like sections, and by degrees the whole length

RHYSSA PERSUASORIA DEPOSITING OVUM IN LARVA
OF SIREX GIGAS.

SIREX GIGAS.

[Facing page 22.]

clears the sheath, passing, however, through the extreme tip, which holds it in place, horizontally into the tree. This explanation is necessary because the casual observer would be unlikely to notice any happenings from the time the fly first took up her position—the ovipositor, to all appearance, being just as it was ; however, it is now an empty sheath.

That such an operation is possible is due to the extraordinary strength and flexibility of the ovipositor, which is not only a drill but a tube, and so sensitive that at the moment it comes in contact with the larva, the ichneumon is prompted to place her egg in the skin of the creature. When this is accomplished the ovipositor is withdrawn ; coming out in the same loop-form, it springs back into the sheath and the fly goes off in search of another victim.

Now is the *Sirex* doomed, though not to immediate destruction, for it must live to nurture the parasite during the latter's larval period. Thus, both grow together, the *Sirex* living on the wood of the tree and the parasite deriving nourishment from the fatty tissues underlying the skin of its host. When both are full fed and the tunnelling operations have ceased, the *Sirex* larva pupates, including the parasite within its chrysalis. Whereupon the

larva devours what remains of its host and itself undergoes the same metamorphosis. Eventually, instead of the saw-fly emerging, the ichneumon pushes through the sealed aperture.

To my mind, scarcely anything in nature surpasses in marvel the manifestations of this class : The curious connection that exists between the fly and the larva of a totally different species, the wonderful adaptability of the organs and perfect subconscious perceptions, are, to say the least, astonishing ; but being merely insects the creatures attract little attention ; and except to those who study such things their very existence is practically unknown.

Ichneumons are essentially hunters and detectives of the first order. Their detective work is undoubtedly accomplished by means of the antennæ, highly specialized sense organs tuned to respond to etheric vibrations. These delicate organs (antennæ) and their modifications, without which the Insect World could have no existence, are no less than " aerials " —physical media for the reception of transcendental impressions, a linking of the material and intangible. Here we have an instance of nature's " intangible connections," whereby all her parts are associated and sympathetically

respond to one another when and as required in the general scheme.

Thus, the life-principle (soul) of the insect or other of the animal world is a centre of subconsciousness, temporarily set apart, but ever "in touch" with the All-Conscious.

The quivering of the antennæ is a marked peculiarity ; so much is this the case that when a fly of any dimensions is seen waving its horns in an agitated manner, it is fairly safe to assume it an ichneumon of some kind.

CHAPTER V

SUBCONSCIOUS MIND IN RESPECT TO GROUPS

THE foregoing show the functioning of sub-conscious mind in single individuals, but where communities are concerned, I believe that the subconscious principle, collectively, is by a telepathic process, merged into oneness ; that is to say, all units within a certain radius are linked together by telepathy so that one mind serves the entire group. At all events, we shall take this as a working hypothesis. Given, then, that the units, collectively, function as one mind, and for the moment lose sight of the fact that, materially speaking, they have separate bodies, it is then conceivable that works of combined labour and joint action can be carried out. But, on the other hand, it is inconceivable that creatures functioning independently on a plane where there is no reasoning mind, can achieve elaborately constructed homes, nests, cells, agglomerated and compound cocoons, etc., such as are constructed and which excite our wonder and admiration.

Yet, the general belief is that they do so. Ants are said to be extremely intelligent creatures, the proof of which is, they say, that the ant's proceedings are directed by distinguishable officers,¹ and so on.

But surely this is looking at the matter strictly from a human point of view. However, it may be said of the ant, that had the creature the merest glimmering of intelligence, it would not strive for an hour to drag a burden over the top of an obstacle when by diverging for an inch or two to one side it could pass without hindrance. The subconscious mind, in this case, rules that a stick must be grasped and borne in a certain direction, but it does not allow for incidental obstructions. Thus the insect is constantly baulked and thrown out of its course, but never at a loss for direction. In this respect bees have the advantage, for there is little or nothing to obstruct flight, therefore they are seen to fly in a straight or *bee-line*. Social and solitary bees and wasps, who, like all insects, have no range of vision, fly unerringly to their cells; the entrance to one of these—a tiny hole—is often completely concealed by herbage. The explanation is that the bee, the nest, the surroundings, all

¹ Dimorphism of insects, a side issue, will be touched on later under hive-bees.

are *pure* nature—parts of a perfectly ordered system timed and tuned to operate in harmony.

To return for a moment to the simile of the clock : So long as the mainspring is active the life and movement of the wheels, arranged in cyclical periods, continues until the spring runs down. Nature indicates the same cyclic system ; but as her mainspring is everlasting and unvarying the works never stop ; which means that life, though transitional, never ceases.

Some do not admit that animals have souls ; at death they are said to perish (annihilation). But this is not the teaching of my observation.

This suggests to me that though man possesses an individual soul, animals belong to what are termed “ group-souls.” A group-soul may be likened to a pool from which drops can be taken (individualized) and subsequently returned to be reabsorbed. This aspect seems to fit in with what I have said regarding communities, and what in future I shall allude to as “ mind-blending.” For if the nature of the spirit principle is to blend when out of the body, it is possible for it to do so, telepathically, when incorporated. Mind-blending, however, I believe to be conditional, and only to take effect within a certain zone

THE PROCESSIONARY CATERPILLAR 29
of telepathy which, in the case of insects, etc., includes but a short range.

To test this proposition I shall describe the manifestations of a group on the same (insect) plane.

Most readers will have heard of the Processionary Caterpillar (*Cnethocampa pityocampa*) : The moth, a common species in the South of France, deposits a cluster of eggs on the needles of a pine-tree. On hatching out, the young larvæ at once set to work and spin a web round and about the fir-needles. In a short time the web assumes a globular form which increases in size as the caterpillars grow. When not feeding, the creatures pack themselves away in the interior of the nest where they are safely protected. After awhile the branch to which the nest is attached is completely stripped of its needles. So destructive indeed are these larvæ that a large colony will practically defoliate the tree ; it then becomes necessary to go elsewhere for food. I do not say they go in *search* of food, for, apparently, they know where to go and how to get there.

One might suppose the caterpillars have only to seek the nearest tree, but for reasons known to subconscious mind, some particular tree is essential. It may be the one affording a good site for the nest, or that the needles are young

30 THE PROCESSIONARY CATERPILLAR

and therefore tender; but whatever the reason, the fact remains, they will quit not only the tree but sometimes leave the plantation and travel a considerable distance before arriving at their destination. Now, as it is absolutely necessary to the existence of the species that the larvæ keep in close company, it follows that when making a journey for the purpose of constructing a new home, an act which can only be accomplished by their combined efforts, they must on no account, so to speak, lose sight of one another. But, like all lepidopterous larvæ, these creatures are sightless, though probably sensitive to light. What is it that takes the place of sight? I believe it to be the clairvoyant faculty of subconscious mind. In any case the larvæ do not act blindly, but start off in single file, the head of one caterpillar close to but not touching the tail of the one in front. In this order they are seen to travel down the trunk of the tree and take the open ground, crossing dusty roads and surmounting such obstacles as chance in the way. No halt occurs, unless it be that the band of processionists is disrupted by some accident. Then the column is held up until the surviving members re-form, when, the broken link being made good, the march continues as before.

The migration of Processionary Caterpillars, which is typical of all migrations, the purport being food, offers exceptional opportunities for test experiments.

Let the observer try the effect of transposing the units of the column : Place (say) the leader at the end and put the last caterpillar at the head of the procession, and then watch results. It will be found that when the disturbance has subsided (this may take some time) the march will continue as if nothing had happened. Here it may be recommended, that if found necessary to handle the caterpillars, old gloves should be worn to be afterwards thrown away, for these larvæ bear an armature of urticating hairs of a dangerous nature, a protection, however, of great service to them when thus travelling in the open.

CHAPTER VI

REVIEWING THE CASE

Now to review this case of the Processionary Caterpillars : We have for consideration the performances of a lowly brood of sightless creatures having no parental protection, and who have not attained the perfect stage ; yet from the first we see them combining to construct a waterproof home protected (eventually) on the outside by a frise of poisonous shafts (hairs shed with the skins), and within are galleries for the convenience of the inmates when resting. When leaving this fortress for foraging purposes the larvæ, though sightless, have no difficulty in finding their way home, and when finally quitting for reasons stated, they march one behind another in orderly procession to spots of which they can have no conscious knowledge. How is it achieved ? Ostensibly they follow a leader ; but how shall the blind lead the blind, and what qualifications has any one that he should assume leadership over his brethren when all are on an equality, the same age ?

The problem has no solution so long as we regard it from a human point of view.

People speak of the wonderful acts and performances achieved by animals, birds, etc., as if they (the animals) possessed human reasoning faculties. This is the point—animals cannot reason ; their actions are due to infallible subconscious mind.

The difference between the two minds would appear to be this : Whereas the self-conscious reasoning mind has an open field, it has no knowledge beyond what, by slow degrees, is acquired from instruction, experience and experiment. The subconscious mind—pure expression of All-Mind, on the other hand, has already perfect knowledge within a certain compass ; *i.e.*, absolute perception of the imminent necessities of the material body it controls, with power to engender actions which further existence and ensure continuity.

As illustration : A spider, in order to obtain its food—a fly, of whose existence it is not consciously aware—is capable of spinning a web, geometrically correct, by which to entrap the fly ; but to no other purpose can it turn its geometrical knowledge.

The reasoning mind (of man) considers the spider's web ; is struck with the *idea* that it is a very practical device ; copies it, and after

some experiments, evolves a net to catch fishes, and again, nets for many purposes. But all this is *learned* from Nature, who *knows*.

“Nature, in her Divine purity, is the image of Deity.” A community of processionary caterpillars is an example of nature in her Divine purity.

These caterpillars do not reason and speculate among themselves as to the ways and means for carrying out their project as would be the case with human beings, who, holding various and conflicting opinions, are forced to set up a leader in whom they can trust, otherwise inevitable confusion results. No, these creatures require neither leader nor physical sight, for theirs is the sub-conscious clairvoyant mind, and, as units which go to make up the procession, they are so linked by telepathy as to blend into oneness—oneness of purpose, which purpose is in tune with the Infinite Intelligence. . . .

Fabre, the famous French naturalist, among other experiments, tried the effect of putting these processionary larvæ on the rim of a large flower-pot, the result being (what the present writer would have anticipated) that the caterpillars processed round and round the rim for many consecutive days, pausing only

at night. This fairly proved there was no leader or intelligence amongst them.

We note that the creatures were unable to extricate themselves from an unnatural position in which they were placed—a situation which could not have occurred in pure nature. For even supposing the caterpillars had fallen on to, or otherwise attained the rim of the pot, the circumstance would still be indirectly attributable to man—the man who, artificially, made the pot.

The fixed laws of subconscious mind cannot be altered to suit unnatural conditions. Its action under the circumstances, therefore, would be to urge the caterpillars forward, and, at the same time, protect them from falling off the rim, which would have the effect of keeping them clinging to it; but in no way would it help them out of an *impasse*, seemingly simple, yet *so* impossible where no reasoning mind exists.

The above experiment suggests the amateur watchmaker, who after meddling with works he does not properly understand, either stops the clock or renders the action irregular.

Fabre, in his *Merveilles de l'Instinct chez les Insects*, tells us that the processionary caterpillars are guided by the silk each leaves behind as it goes along, and, by this means, he

says, the larvæ find their way back to the nest. But, as regards the processionary march, the leader can have nothing to guide him, nor would the thread serve when crossing a dusty high-road or wind-swept sandy ground.

Were these caterpillars solely dependent on "*le rail soyeux*," as Fabre terms it, they would soon become *disbanded* and so lose touch of one another. *Le fil luisant*, however, is an invaluable safeguard against falling from slippery situations—the narrow rim of a flower-pot, for instance ; for it ensures secure footing, and, moreover, it is a natural precaution which is common to most arboreal larvæ, especially in their younger stages ; were it not so, they would risk being blown or washed from the trees.

That this thread is instrumental in guiding the larvæ to the nest is hardly probable, seeing that the whole of the branch is matted with it. When a larva has fallen from the leaf and is left suspended in the air the thread is useful in helping it up again, but on gaining the leaf the creature must depend on its sense of direction.

Though none quite so remarkable as the processionary larvæ, there are many other species of gregarious caterpillars who "follow the leader" in much the same way. For

example, we have a British species, the Buff-Tip (*Pygæra bucephala*). As in the former instance, the moth deposits ova in batches on the undersides of the leaves of oak, sallow, etc. The larvæ, on hatching, occupy a single leaf, and when this is demolished proceed to the next, and so on, until they attain a size when one leaf will not contain them all ; still, they do not wander further than the adjacent leaves. Eventually, the twig being stripped, the party with one accord makes a retrograde movement, marching back down the stem to the first or second bifurcation, thence travelling upwards to start feeding in a fresh place ; or, it may be, they will proceed to quite another part of the tree before resuming their chief business in life. These communities, however, do not form a nest or spin a matted web ; but when nearly full grown, members are inclined to stray, though this is not invariably the case.

Larvæ of the Small Eggar Moth (*Eriogaster lanestris*) form colonies and spin an irregular web on whitethorn.

Several species of British butterflies (*Vanesidæ*) dwell together in companies, and one of the Flitillary group (*Melitæa aurinia*) colonizes, the larvæ sheltering throughout the winter under a dense web spread over the scabious plant.

The same is noted among micro-lepidoptera: the web of the small ermine moth festoons, locally, every hedge and bush.

Larvæ of some of the Saw-Flies are strictly gregarious, and may be commonly seen encircling the leaves of poplar, willow and other trees; clinging to the outer edge of the leaf they form a kind of fringe. As regards the collector of lepidoptera these creatures are worthless, and it may be a "tip" to the young entomologist to know that they can at once be identified by a dark spot on either side of the head which looks like an eye, but is not; and also from the fact that these larvæ have no "claspers," but use their tails, which are more or less prehensile.

I particularly mention these species because they have a curious habit when approached of curling up their tails *simultaneously*, a protective precaution, and one calculated to startle a too inquisitive bird; but the point to note is the *uniformity* of the action.

Although the lepidopterist has no use for saw-flies, nevertheless they represent a very interesting class which a specialist might do well to study, as there is still much to be learned concerning them. The preliminary stages and general appearance of these insects is very similar to those of lepidoptera, and yet

the final development has no resemblance whatever beyond, perhaps, the fact that the imago possesses four wings in which, and in other respects, it differs entirely from ordinary dipterous flies.

The above are all examples of telepathic mind-blending without which (in the writer's belief) it would be impossible for a group of sightless creatures to keep together, and in many cases to work together for the good of the community.

Although there be many (body) units there is only *one* (subconscious) mind ; a mind, albeit, that knows its business and will, if uninterrupted, infallibly carry out the life-scheme to a successful issue.

Small and insignificant as the creatures may appear (size is only relative), it would be foolish to suppose they have no mind. Life, however lowly, could have no place or meaning without mind ; not personal intelligence, for that does not obtain in the Animal World, but mind which is linked with the All-Knowing and, therefore, independent of mental effort.

CHAPTER VII

NESTS OF BIRDS

EVERY schoolboy knows the difference between a blackbird's and a thrush's nest. Here we have two distinct birds closely allied and of much the same habits, building their nests in similar situations and using the same kind of materials, but, with this marked difference, that whereas the blackbird's is lined with dead grasses, the thrush plasters the interior of her structure with mud which on drying becomes as hard and smooth as the inside of a cup. And so with the thousands of different kinds of birds all over the world ; no two distinct species build exactly alike. In some cases the difference is so slight that the casual observer is puzzled to tell them apart, but the expert has but to see an empty nest to identify the architect.

Some nests of our British warblers—the whitethroat class, for instance, are almost identical. These structures consist solely of dead grass-stems with a lining of hair, but

NEST OF WILLOW WARBLER
(*Phylloscopus trochilus*).

THE WILLOW AND WOOD WARBLERS 41
even these can be identified by the practised eye.

Two little migrants, the Willow Warbler (*Phylloscopus trochilus*) and the Wood Warbler (*P. sibilatrix*), build similar oven-shaped nests on or close to the ground. Though outwardly resembling one another, there is no difficulty in distinguishing them. It is a curious fact, that whilst the willow warbler elects to line her nest with massed feathers, the wood warbler *never* uses a single feather as lining.

No matter in what country these birds are known to build, this is invariably the case. It is impossible to conjecture a reason for this divergence. Why, we may ask, should feathers not be used in both cases, or in neither case, when the habits and mode of life of these two species is practically the same? We may feel sure, however, that this arrangement is not without design; when understood, nature's adaptations are always purposeful. Again we marvel, how can the one bird *know* that in her case feathers must be collected and placed for a lining, and in the other that feathers must *not* be taken inside the nest? Such knowledge in these tiny creatures is not of themselves, acquired, but spontaneous—of the Absolute.

The nests of these warblers are so wonderfully concealed in the undergrowth of woods

that unless the bird is watched, or accidentally put off, it is next to impossible to find the nest ; even when the bird has been started, it takes some time to discover the edifice. But the owner has no difficulty in finding it ; she comes straight home to the very spot. In pure nature there never is any question of losing the way ; creatures return *naturally* to the domicile of whatever description ; but if, in the meantime, the habitation has been interfered with or moved from the original site, the creature is baffled, and only by chance discovers it.

Although some of nature's schemes are difficult to follow, there are others which speak for themselves. For example, the water ouzel, a bird which belongs to the same order as the blackbird, builds a blackbird's nest, but she covers it with a *roof*. Why? Because the site is always a damp situation (generally under a bridge or overhanging rock), and the mossy dome *protects* the nest from the continuous drips of water.

I have always thought this a particularly notable instance of subconscious foresight.

Another remarkable example of nature's foreknowledge is shown in the case of the Crowned-Hornbill (*Lophoceros melanoleucus*), a South African species. This bird nests in the

hollow of a tree, and being of fair proportions requires a hole large enough to admit its body, which means that the aperture is open to the incursion of wild cats and such-like marauders with which the country is infested.

Now comes what appears extraordinary intelligence on the part of the birds. When incubation commences and the female has taken up her position on the eggs, the male bird, from the outside, plasters up the entrance with a compost (chiefly excreta) which forms an impervious cement ; but, at the same time, he is careful to leave a narrow slit through which his imprisoned spouse can just protrude her bill. Here, incarcerated, she remains throughout the period of incubation and until the brood is fledged, whilst her faithful mate, day after day, brings all they need in the form of food, which is duly passed through the slit. When the time comes the prison wall is hacked out by the male bird, and the whole party emerge. It will be seen that the bill of the hornbill is a wonderful modification, doubtless intended for the very purpose of breaking down the concrete substance of the barrier. All the hornbills, of which there are many species, have extraordinary bills, seemingly out of all proportion to their persons, and strongly suggest a pickaxe.

It is said of the crowned hornbill, that if an untoward accident befalls the male during the period of incubation, the neighbours (hornbills) attend to the wants of the widow and orphans, and let them out in due course.

A British species, the Nuthatch (*Sitta Europæa*), also has this habit of plastering up the entrance to her nest when the opening is larger than the circumference of her body. The intention is the same, viz., to keep out vermin of a predatory nature.

As a purely natural structure a bird's nest is a wonderfully beautiful object. Let us examine some of these "homes without hands." Take, for instance, the nest of the Long-tailed Tit (*Parus caudatus*), and observe how this exquisite fabric is bedecked with lichens which match the surroundings, and how the interior is lined with the softest feathers in order to preserve the fragile little eggs from being crushed against any chance hard substance contained in the inner walls of the nest. The whole is admirable ;—one of nature's masterpieces. Now look at the builders themselves and note the diminutive beak, the only tool employed in raising this marvellous structure whose walls are composed of moss and lichen interwoven with spider's web. Although it is a comparatively

NEST OF LONG-TAILED TIT
(*Parus caudatus*).

[Facing page 44.]

NEST OF GOLDEN-CRESTED REGULUS
(*Regulus cristatus*).

large nest the architect has the distinction of being one of the smallest British birds ; but what a mind (subconscious) invests this diminutive body ! Human intelligence with all the appliances in the world could not fashion a like structure and endow it with the same elasticity and compactness.

Excluding the Golden Oriole (*Oriolus galbula*), an occasional visitor, the Golden-crested *Regulus* (miscalled wren) is the only British bird that builds a pendent nest, and a very beautiful nest it is when seen suspended beneath the bough of a fir-tree.

Hanging nests call for particular notice because they are built on a different system, the reverse, in fact, to an ordinary nest. That is to say, a bird that builds in the fork of a tree begins her work by placing material in the hollow and works upwards, from a foundation ; but the pensile nest must necessarily be commenced from above and so continued downwards ; also the lappings must be very firmly bound and secured to the overhead supports, as from these depend the whole fabric, plus the weight of the bird and her clutch.

The gold-crest's nest, however, is comparatively a simple structure to some of the hanging nests of foreign species, which should

be seen *in situ* to be really appreciated. Indeed, there would appear to be no limits to the ingenious (the only word) and at the same time æsthetic adaptations whereby nature adjusts herself to the surroundings.

The most primitive nests are those of the pigeons, themselves of very ancient descent. The ancestors of all the pigeons nested in caves and cavernous rocks, which is still the habit of the Rock Dove (*Columba livia*), from which our domesticated pigeons have sprung, and to a lesser extent the Stock Dove (*C. oenas*). The latter, however, has taken more to the open, though it still retains the habit of nesting in dark places—holes in trees, or on the top of old nests of crows, hawks, squirrels, etc., when overhung and darkened by fir boughs. One more step into the light and we have the largest British pigeon, the Ring Dove (*C. palumbus*), which builds the same primitive nest but which is openly exposed—a few sticks loosely spread through which the two white eggs, usually associated with birds who nest in dark places, are visible when looked at from beneath. But though primitive and fragile, the wood-pigeon's nest seems to answer nature's purpose, judging from the enormous flocks seen in many districts after the nesting season. In this case no modification was

necessary, but there are many species of birds who use practically nothing but sticks and yet build stable and elaborate nests ; the magpie is an example. The magpie has the reputation of being a particularly cunning bird, which some might say accounts for the cleverly constructed tectum he puts over the top of the nest, which effectually conceals the eggs, and is a protection against plunderers in general. The magpie builds a solitary nest with no attempt at concealment, therefore a covering of this kind is more necessary than it would be, say, in the case of the rook who, surrounded by neighbours, has less to fear from outsiders, there being always a certain number of birds left to guard the rookery.

Perhaps the most artful builder using sticks only is the Firewood-Gatherer (*Anumbius acuticaudatus*) of South America. The nest of this bird is certainly a marvel for strength and compactness considering the unyielding nature of the material. A specimen of this nest may be seen at the Natural History Museum, South Kensington. Bound up with the sticks there appear some strands of iron wire which, the writer would say, add unnaturally to the stability of the nest. It is said that the bird frequently uses the cross-

bars on telegraph poles as a site for the nest, and no doubt the wire left by the workmen had been picked up and unconsciously utilized by the birds. This is sometimes pointed out as an act of intelligence.

NEST OF BLACKBIRD
(*Turdus merula*).

CHAPTER VIII

EGGS OF BIRDS

IN the same way that the nests of birds differ in appearance and structure, according to species, so do their eggs, even eggs that are purely white have some specific differences ; the size of the egg, its shape, the consistency of the shell surface (smooth or rough) and the quality of the whiteness, must all be taken into account. Purely white eggs, as I have said, are usually found in situations where light does not penetrate, or else are the eggs of birds whose ancestors nested in dark places, as in the case of the pigeons.

From white we come to tinted eggs uniformly coloured, graduating from very light shades to intense colour, such as the pure immaculate blue of the hedge-sparrow's egg. The lightest coloured eggs (not purely white) are those of aquatic birds. It should be noted that some of the ducks nest in the dark. The common wild duck occasionally builds in the hollow of a tree ; the shell-duck invariably

has her clutch in holes (rabbit holes) under ground. The majority of birds, however, lay maculate eggs of great beauty and attractiveness.

Now, the question arises, wherefore are birds' eggs thus beautifully marked and coloured? When birds build no nest, but lay their eggs on the bare ground, or amongst shingle and stones, the markings no doubt are protective; but only from the fact that the blotches and spots, taken in conjunction with the surroundings, break up the outline of the eggs; the effect would be just the same whatever the colours, so long as the eggs were spotted.

There are, of course, various theories to account for the colours and markings on birds' eggs. For instance, in the case of the hedge-sparrow's egg, Mr. E. Kay Robinson, the distinguished field-naturalist and authority on these matters, suggests the reason why hedge-sparrows' eggs are so deeply coloured, is that they shall act as a warning to browsing animals. An animal, he says, in the act of feeding on low-growing shrubs, suddenly disclosing a hedge-sparrow's nest, is startled by the appearance of the intensely blue eggs, and so ceases to rummage in that particular spot; the nest is thus saved from destruction which

NEST OF HEDGE-SPARROW
(*Accentor modularis*).

otherwise might have been dislodged. The idea is quite in keeping with some of nature's schemes, and coming from such authority deserves due consideration. Personally, however, I think that this proposition is invalidated by the fact that the hedge-sparrow rarely if ever places her nest in a position where it is possible for *browsing* animals to approach it. The hedge-sparrow's nest is almost invariably situated well inside some prickly bush, a quickset hedge, a woodstack or pile of faggots ; in any case, in a position where large animals cannot get at it. In fact, I should say that if there is one small bird's nest fairly secure from the inroads of browsing animals it is the hedge-sparrow's.

The sight of any colour other than green, where green is expected, might very possibly deter animals from making further investigations in that particular spot ; unless, of course, the animal should be attracted by curiosity, but this is hardly likely in the case of so small an object as a bird's nest.

To my mind the colours and markings on birds' eggs are not necessarily intended for utilitarian purposes. Like the natural grace of the birds themselves, the loveliness of flowers, the exquisite tints of sea-shells, the splendour of butterflies' wings and a thousand

other beautiful, natural objects are purely æsthetic expressions of the Spirit which underlies everything.

Though birds' eggs can generally be identified by characteristic markings peculiar to the species, they vary considerably, both as regards the species and also the eggs laid by a single individual. Guillemots' eggs are perhaps the most variable.

For the information of those who may be unacquainted with the habits of this marine species, I may mention that Guillemots (*Uria troile*) nest together in large companies on the rocks in more or less inaccessible places, the eggs being laid on the bare ledges of the rocks. Each bird lays a single egg, but, in several respects, a remarkable one. To begin with, the egg is enormous for the size of the bird ; its shape, too, is peculiar. The small end, it will be noticed, tapers out to a point ; no two eggs are exactly alike ; the spots and blotches, as a rule, are very numerous, though occasionally an egg has few spots, and sometimes it is quite plain.

The reason for the shape of the guillemot's egg is obvious. By placing this egg on a smooth table and blowing upon it, it will be seen that instead of shifting from its position, the egg merely twists round on its axis ; thus,

LARVAE OF SAW-FLY ON POPLAR LEAF (p. 38).

EGG OF GUILLEMOT
(*Uria troile*).

DISSIMILARITY OF GUILLEMOTS' EGGS 53
when exposed on the rocks the wind has little power to move the eggs from their "seats."

This special modification is, as I have said, for an obvious purpose; but to account for the dissimilarity of the eggs is not quite so apparent, though, probably, it is due to idiosyncratic excretion and distribution of the pigment. The occasional occurrence of a plain egg rather points to this conclusion. Still, there is what, at first sight, appears a most plausible explanation, and one which is accepted even by naturalists. It is this: Guillemots lay diversified eggs so that each bird may recognize her own egg when returning after an absence.

From the human point of view nothing could be more *reasonable*. But in these pages we are not studying the Animal World from our own outlook, but, if possible, from the plane on which the creatures themselves function.

Personally, I can hardly imagine a guillemot wading about amongst hundreds of others in search of her own particular egg, and perhaps thinking to herself, "I wonder if this is my egg; the markings seem to tally?"

If the above notion is the true interpretation, then it follows that the guillemot is capable of reflecting on abstract matters,

54 CHANGING THE POSITION OF EGGS

which, of course, would invalidate this treatise. For there cannot be two ways about it : either the bird does reason, or it does not, and what applies to one creature applies to all of them.

It might be supposed that the matter could be put to the test by changing the eggs ; but though it might be possible to keep these in view, it must be quite impossible to identify the owners, who resemble one another absolutely. However, if such could be done I think it would be found that the birds returned, each to the identical spot where its egg *had* been ; in fact, where it had been *laid* ; and, so long as the birds found eggs reposing on these same spots, they would be content to cover them, whether their own property or not.

It may seem ruthless to attempt to shatter a romance at once so popular and attractive ; but in the interests of science progress we must not be led away by sentimentality. Much harm is done to the cause of true knowledge by accrediting the Animal World with human attributes and sentiments which, without self-consciousness, the creatures cannot possibly possess.

The eggs of plovers, woodcock, snipe and some of the waders, though not elongated to the same extent as those of guillemots, are

modified on the same lines, and it is a curious fact that eggs of this description always, without exception, lie in the nest (or depression in the ground) with the small ends pointing inwards, thus indicating a natural scheme and not individual fancy on the part of the bird. Like the petals of a flower radiating from the calyx, the "clutch" presents a beautiful and symmetrical form. Even here, where unperceived perhaps by any (human) appreciative eye, nature still displays æsthetic design. But, to return to the practical. It would be interesting to know how the eggs come to be so arranged? Are they duly laid in this position, or are they subsequently adjusted by the bird? For my part I am inclined to think the eggs are laid in their proper position. At the same time, supposing the bird to adjust the egg after laying it, the fact would not be more remarkable than is the act of arranging her materials when shaping the nest. But however this may be, perfect knowledge obtains as to what has to be done and when and how to do it, but it is not conscious knowledge.

CHAPTER IX

AN ADDLED EGG

THOUGH I cannot believe birds capable of recognizing their eggs by particular markings, I have every reason to think that a bird knows (subconsciously) when an egg is addled, in the same way that a dormouse or squirrel knows, and rejects without opening it, a bad nut.

(What domesticated poultry may or may not do, in regard to infertile, or addled eggs, is no criterion, because, not only are they mixed breeds, but bred specially for their laying and *brooding* qualities, and, moreover, are not living under natural conditions.)

To give an instance which, if not positive proof, is very strong evidence that a bird knows an addled egg.

In my bird's-nesting days I was keen to procure the eggs of the Pied Flycatcher (*Muscicapa atricapilla*). Having located a pair of these birds I eventually discovered the nesting-place in a hole of a decaying tree, some fifteen to eighteen feet from the ground. On

climbing up to it, I espied four light blue eggs resting within and a little below the orifice, which, however, did not permit of the passage of my hand. There was nothing to be done without tools ; I therefore determined to return next day duly provided with chisel and mallet. The place was a preserve, and not being particularly anxious to be caught by the keeper, I did not return till evening. On again "swarming" up the stump I noted several holes below the one containing the nest, evidently the work of the barred woodpecker. Arriving at the top, I beheld the four light-blue eggs as before, but on getting to work found the job more difficult than I had anticipated on account of there being no support for my feet, consequently the cutting out business was slow and exhausting. In the meanwhile, it was getting dark, so that I was obliged to give up for that day ; however, I had succeeded in opening out the hole to some extent. After climbing the tree on the following day I was surprised, and at the same time greatly disappointed, on finding the nest contained only *one* egg, along with some chips which had fallen through during the previous day's work.

This egg, however, I was determined to have, and in due course extracted it intact.

Whilst on my way down I chanced to look at the hole next below the one I had been at work on, and to my astonishment beheld *three* blue eggs reposing inside. Had these eggs been there all along I could hardly have missed seeing them when passing up and down the tree. Now, as the pied flycatcher was distinctly a rare bird in these parts and, for that matter, nowhere common, I could only conclude that the pair had *moved*, or were in the act of moving their eggs to a place of safety. This discovery so impressed me that I decided, then and there, not to interfere further with the birds or their treasures, so returned home with my one specimen. But this egg was to prove (at all events to me) a revelation in Natural History. It was an *addled* egg, and my firm belief is that the birds left it *because* it was addled and therefore, from nature's point of view, of no account.

It may appear more extraordinary that a bird should know a bad egg which shows no signs exteriorly, than to identify one by its particular markings. But this, in my opinion, is just the point which marks the difference between the reasoning and the instinctive mind. The reasoning mind acts on impressions from without ; the instinctive or subconscious mind, *sees* from *within*.

To take note of the particular markings on an egg and subsequently to identify it when lying among others which resemble it, would not be impossible or perhaps difficult for the reasoning mind, but it involves *consideration*, which implies the faculty of *thinking*. Animals do not possess this faculty, but they have unerring intuition.

With regard to the incident above related, it is, of course, open to readers to form their own conclusions ; I can only say the facts occurred exactly as stated. How the birds removed their eggs I do not pretend to say, but it is well known that animals and birds do shift their belongings on occasions when danger threatens them, and there is still time to effect a removal. I myself have seen, on more than one occasion, a wild duck carrying (flying) her young from the nest to a distant piece of water. As the bird made a number of trips, I imagined she was carrying one only at a time. On another occasion the duck, on catching sight of me, suddenly altered her course and, at the same time, let fall a duckling which landed unhurt on a quickset hedge. Here, again, I could not be sure that this was the only one carried.

My impression is that during transit the youngster (or two) lies hunched up under the

60 REMOVING THEIR EGGS AND YOUNG
abdominal feathers supported by the legs of
the parent.

Woodcocks are known to carry their chicks, and the cuckoo, by means of its bill, lifts the egg into someone else's nest. Therefore the removal of their eggs by the pied flycatchers is by no means an impossible feat.

It might be argued that if a bird is aware of a bad egg, she should (irrespective of markings) be equally capable of knowing her own egg by means of the same faculty, call it "inward perception." I admit it would be quite possible *if* it were necessary. But, in my belief, it is not necessary in nature's scheme that a bird shall recognize her own egg. Nature's only concern in the fertile, living egg is that the contents shall be hatched out into the world, and, so long as this is accomplished, it is of no moment as to *who* actually broods over it.

The cuckoo's case shows this very clearly.

Nature having no use for the bad egg, it goes, so to speak, into the "melting-pot"; after disintegration the products are used over again in building up fresh organisms.

For the sake of convenience I have used the expression, "a bird is aware of an addled egg." Perhaps it would be more correct to say that, so far as the bird, an unreasoning creature, is

concerned, an effete egg is non-existent ; there being no life in it, all connection between the bird and the egg ceases ; thus the bird ignores the egg because, mentally, she is *unaware* of it. Hence, notwithstanding its perfect outward resemblance to the others, the pied flycatcher takes no notice of the rotten egg, but leaves it in the nest along with the chips and other rubbish.

CHAPTER X

THE POWER OF FLIGHT

WITH the exception of insects, of which there are very ancient traces, the power of flight seems first to have developed in the Reptilian Order, though there it has since lapsed. Then winged birds appeared on the earth, and now each of the remaining great Natural Divisions: viz., Aves, Pisces and Mammalia, have flying representatives. Had the power of flight not so developed, it is possible that man, who takes his cue from nature, might never have discovered the fact that a body can be supported and moved in an element lighter than itself. Though man has always had the true model, it was long before he succeeded in imitating, in some degree, the flight of a bird—amazing result of natural evolution.

The aeroplane, a wonderful contrivance of man's skill and ingenuity, would seem the nearest approach to natural flight he is ever likely to achieve; for though modified and improved, it must always remain what it is,

a machine—a mechanism apart from the operator whose very life depends on the efficiency of its moving parts. But this is not so with the bird, whose wings are *parts* of itself over which it has absolute command—wings ever ready and fit to cope with any possible eccentricity of the atmosphere.

Flying is as natural to a bird as the act of walking is to man ; in neither case is instruction necessary, the power develops of itself, subconsciously. Fond mothers, however, are under the impression they teach their infants to walk, but this of course is not really the case. If left entirely to its own devices a child would walk on its own account so soon as its legs are strong enough to support the weight of the body. Like its primæval ancestors, an infant begins by moving about on all fours ; after awhile it instinctively clutches a fixed support (as it might be a tree) and pulls itself up to an erect position, which throws weight on the legs and so strengthens them. This is the first step in a natural way. The next is to totter from one support to another close at hand. As strength increases supports are no longer necessary, and man in the making steps out into the world an erect form, not of his own volition, but the upright creature nature intended him to be.

Looking into nature, we note that the chicks of game-birds and others (ground birds) run off immediately after hatching, and ducklings sometimes fall out of the eggshell into the water where they swim, compatibly with their size, as lustily as the parent. These are not taught; they have nothing to learn; the knowledge of how to do it comes subconsciously. The legs, in these instances, are already stout and strongly developed. On the other hand, the legs of arboreal birds when first hatched are weak and powerless to support the body; but this class depends on wing power more than legs for locomotion, therefore whilst the flight-feathers are growing there is time enough for the legs to develop. For this reason the birds are confined in a nest until the legs and wings are fit for service. On quitting the nest the young birds are capable of perching and making short flights when occasion demands. The first attempt at flight is, of course, barely more than a flutter, resulting from lack of strength rather than ignorance of how to make use of the wings.

That birds teach their young to fly is a common belief, and, moreover, one for which there is some sort of foundation. But when studying nature we should be careful not to be deceived by appearances. Let us see how

this works out. For instance, the young of small birds, sparrows, finches and the like, shortly after leaving the nest, fly at random into the trees and thus become separated. Having found suitable perches these young birds, if undisturbed, remain quietly in the same places hidden amongst the foliage, where the parents find them and for some days continue to feed them at regular intervals. In the meanwhile, the tail and wing feathers of the fledglings are growing out to their full length. It is now the birds begin to move about and are prepared to seek their own living. But the immediate surroundings (a plantation, it may be) do not offer the kind of food suited to this class of bird, therefore the old birds are seen to come to the rescue. Uttering call notes, they attract and induce the fledglings to follow them; the latter *flutter* in the wake of their parents, who lead the way to the nearest field or open space bordering on the plantation; here, on the ground, the young ones begin to pick up food for themselves.

Another example of what seems to be an exhibition of parental schooling is when a pair of swans is seen flapping along the surface of the water followed by all the cygnets. With great noise and the splashing of many wings, the spectacle is pleasing and always attracts

66 TEACHING THEIR YOUNG TO FLY (?)

attention. On nearing the margin of the pool the whole party fold their wings and plough through the water until the impetus is spent ; facing round they repeat the performance, returning whence they came. This demonstration, which is repeated daily, has all the appearance of a lesson in aviation. Beholders exclaim : “ Look at the swans teaching their young ones to fly ! ” And it certainly does look like it. But I believe that if the parent swans could be interrogated, they would say : “ The object of this aquatic demonstration is not to teach the youngsters how to fly, for that knowledge would come to them in any case, naturally ; but simply to get rid of them. After a few trials we manage to get the cygnets up into the air and then take them away to the sea or the larger lakes, and if they attempt to return, much as we love them, we are compelled to drive them away ; for you will observe that this piece of water is of small dimensions, and therefore not calculated to maintain more than our two selves after the winter has set in.”

And so it is, a pair of swans take possession of a small lake or pond and make it their home for life. If there is an island on the lake, so much the better, it will surely be chosen as a nesting site.

The water and surroundings are in every way suited to a pair of birds together with their brood for the summer, when the weed is abundant, but the place cannot permanently accommodate a number of these large birds, therefore the young must be sent off elsewhere to shift for themselves.

A law of nature decrees that as each generation comes into existence it shall be seasonally scattered and distributed broadcast in order that gaps may be filled and the earth replenished. The old swans, in the meanwhile, have no conscious knowledge of these, nature's great schemes, but being one with nature are subconsciously impressed to act in certain ways at definite times and seasons. This they do with the utmost regularity and punctuality, not only swans but all wild-life, animal and vegetable alike.

Swans are "exposers"; they do not seek protection under cover, but face an enemy boldly in the open even to the point of attack, and at the breeding season clear the precincts of the nest of every living creature. So fierce are they when engaged with their domestic affairs that to approach the nest is a matter of some danger; but though on occasion roused to fits of anger, the mated (for life) couple show great affection and attachment for each other.

68 HOW BIRDS RECOGNIZE ONE ANOTHER

Swans resemble one another to an extent that makes it next to impossible to identify any particular bird when a number are collected together. We can, however, note the males, females and cygnets ; otherwise, any one in its class is as like to another as it is possible to be.

Now the question is, how do the birds manage to pair off with their rightful owners when many are together in company (a herd of swans) ?

To suppose that a husband, in bird life, can recognize his wife by facial or other distinguishing features, would imply that we are still stumbling over the old obstacle—reasoning mind.

To recognize and identify anything from outward appearances means, at least, momentary consideration. But, we have agreed, birds don't think, not even for a moment (to think is impossible without word-forms) ; therefore, to scrutinize a mate with a view to identification cannot be done without conscious mental effort. Birds have no need of any effort of the kind, because, within a certain area, telepathy unites them ; in the case of a mated couple the connecting link is yet stronger. Thus the birds pair off together, whether in the daytime, or at night, without necessarily calling to one another.

As I said at the commencement of this treatise, telepathy is only just traceable in man ; the power has declined proportionately as his self-conscious mind assumed control. It is therefore no longer essential. But in the Animal World telepathy is a potential faculty which inter-connects subconscious mind ; the creatures are thus *en rapport* ; silent intercourse is established which, in my belief, accounts for the combined movements and achievements where two or more work together in perfect sympathy without language or direction. If this is so, it is possible to understand how a pair of birds, between them, construct a nest.

Telepathy is the capacity for responding to spiritual vibration under sympathetic action. Sympathy is the one great power throughout nature.

Sympathy is Love—love which engenders all things. . . .

The swan (*Cygnus olor*) is the heaviest British bird that flies. The wings of a swan are extremely powerful, and when cleaving the air make a whistling sound which can be heard for a long distance.

The weight of a full-grown swan is about 30 lb., and the stretch of wings over 6 ft. The

golden-crested regulus weighs 80 grains, with a wing extension of 6 in. The wings of both species are structurally alike, and so are the wings of all birds. The feathering system, subject to modifications, is also the same throughout. This clearly shows that the wing of a bird is the best possible design for the purpose. It has been naturally evolved and apparently reached finality, for it is inconceivable that flight could be more perfect than manifested by some birds. For instance, the majestic flight of an eagle, the marvelous aerial evolutions performed by the swift, or the lightning rapidity of the hummingbird's flight, only to mention three. In truth, these aviators, each in its own realm, holds complete mastery of the air.

NEST OF LESSER WHITETHROAT
(*Curruca sylvicola*).

Facing page 70.

CHAPTER XI

DIFFERENT MODES OF FLIGHT

It has never been quite determined how a bird flies. Flight differs according to the species, and is characteristic in so far that we can generally tell what manner of bird it is from the style of flight. Some birds fly in a straight line, some with an undulating flight, and others erratically. Then there are the slow and rapid fliers; but when all is said, the wing action is the same, viz., a straight up-and-down movement, more or less rapid.

It may be said that a straight up-and-down flapping action, though it may have the effect of lifting a bird into the air, would not propel it in a forward direction on a level plane. Some believe that the forward motion is obtained by a "scooping" action; it is said that the wing moves in the form of a figure 8, something on the principle of an oar when pulled or pushed through the water and "feathered" back into position for the next stroke, a mode of propulsion which serves well

enough when the movements are comparatively slow, for there is then time to effect them, but in the case of the bird there is no time for a complicated movement, a double action, as it were, at each succeeding wing-beat.

This principle, it seems to me, would scarcely apply to a humming-bird, for example, a bird that vibrates its wings with such rapidity as to become invisible, and which, as the name implies, produce a musical note. The humming-bird's wing is modelled in the same way as other birds, therefore we may presume they are actuated in the same way, only faster.

As bird-flight can be witnessed at any time, it is better to study it practically than theorize about it. When flying, birds should be watched from different points of view; from above, from underneath, laterally, and, at the same time, as closely as may be. Given, then, that all birds fly on the same principle, if not in the same form, we shall do well to mark the wing action of a slow flier, in which case each stroke of the wing can be distinctly seen. A heron, for instance, is a slow mover, and, therefore, a good subject for study in this respect, the only objection being that the bird is wary and difficult of approach;

but opportunities do occur. As a matter of fact, they occur frequently in the experience of anglers. When a heron, suddenly surprised, flies from the bed of a stream, what does the angler note? After the first awkward rise in which the bird nearly overbalances in its efforts to get clear of the bushes, the wings assume their normal action—a steady up-and-down flap-flapping—and though no “scooping” can be detected, the bird gathers way and is soon out of range.

Though they serve perfectly for this particular bird's requirements, the wings of the heron are cumbersome and obviously ill-adapted to eccentric movements such as “scooping” must entail. Therefore it seems unlikely that any such action exists; at all events, it is not apparent.

Among slow-flying birds may be included the rook, lapwing (green plover) and gulls. The flight of the black-headed gull can be investigated at close range when these birds are being fed with bread, which, by the way, they catch very deftly.

The black-headed gull (*Larus ridibundus*) appears a much larger bird than it really is, which is due to a dense coating of light body-feathers and large expanse of wing. Though the body is light the wings are strong and

muscular. The result of this is that when the bird flies with energy, the body is "hoisted" at each downward beat of the wings, instead of maintaining a level plane as in the case of most birds. This uneven motion ceases when the gull "glides." In this instance we can detect nothing beyond a simple up-and-down flapping of the wings.

Pigeons illustrate another style of flight. Now tame pigeons afford every facility for observation, and should be watched when alighting and on rising from the ground at feeding times. For the most part, beyond admiring the graceful flight of these creatures, people pay no particular attention to the actual system of their flight ; as birds they fly, naturally, of course, and there it ends. But I think it might be instructive if those interested were to write, for publication in some paper, their views on this matter of flight, which at the present time is of exceptional interest. Personally, I herein state my own opinions which, though not necessarily the true interpretation, may nevertheless be found suggestive.

A migrant known as the "summer-snipe" (*Tringoides hypoleucos*), arriving in April, and which frequents streams and the margins of

lakes in this country, shows to advantage the characteristic flight of the sandpiper tribe. This speciality of flight is well adapted to birds whose habit it is to skim lightly over the surface of the water, or equally over the face of level sand-tracts. This bird permits of close inspection when nesting, and the chief point to note in regard to its flight is the very short up-and-down movement of the wings, the scope of action being less than in any other genus. It would seem that the down-stroke is suddenly checked when on a level with the body of the bird, which permits of the sandpiper flying close to the surface without, at the same time, touching the water with the tips of its wings. The space between the bird's breast and the water is probably less than an inch when thus "flitting" from shore to shore, for though the tips of the wings never actually touch the water, little puffs of air in the wake of the bird may be seen ruffling the surface when the water is smooth.

This is a very graceful flight, characteristic of all the sandpipers, but not in the least calculated for "scooping," because, as I have said, the wing-beat is too short to allow of any secondary movement.

Now that we have considered some of the different forms of flight, we shall examine

the wing itself. Without going too deeply into anatomy, it may be briefly said that the wing of a bird corresponds to the arm of the human species, and that the chief bones include the brachium, antibrachium and manus (the hand), from which subtends, in fan-like extension, the "primaries" or flight-feathers; next in order to these are the "secondaries," and above, proceeding from the shoulder, the scapular feathers which form the wing cover. There is also a group of stiff feathers attached to a small spur-like bone (the thumb) which projects from the metacarpus or wrist joint; this is known as the bastard wing. In the Spur-Winged Plover, the digit terminates in a hook, and is apparent outside the plumage.

The wings of birds are curved, some more so than others. The feathers overlap one another and lie closely appressed, taking the same line of curvature, consequently are more or less bent according to their relative positions on the wing. The curved shaft of each feather tapers to a sharp point, which renders the feathers spring-like and resilient; thus the feather is seen to bend under pressure from above, but resists pressure in a contrary direction. This is the nature of a single feather, and the same applies exactly to the

wing taken as a whole; in fact, it is the valve principle.

To see how this plumous adaptation actually behaves when in operation it will be necessary to proceed slowly in order to follow each movement separately.

The first act is the spreading of the wing. Unfolding at the elbow, the "arm" is extended and held in a rigid position at right angles to the body; set in motion it beats the air with a uniform straight up-and-down action. Now, for a moment, supposing in the place of the wing, we substitute a flat piece of wood of the same shape and subject it to the same movement; at the utmost speed it would never develop lifting power in the slightest degree, simply because the air presses equally on both sides; but in the case of the wing, the air pressure is *not* equal on both surfaces. At the up-stroke the whole wing bends to the pressure, which reduces the surface area whilst the air slides easily from off the rounded form; at the same time, the primary and secondary feathers, being unsupported for their greater length, open out, allowing passage to the air. Thus it will be seen that the upper surface of the wing offers very little resistance. But all this is reversed at the down-stroke, when the under-surface

78 BIRDS RISING FROM THE GROUND

feathers, subjected to the air-pressure, flatten up against one another, but are supported by graduated tiers of feathers at the back, thus effectually stopping the air ; at the same time the wing yields to the flattening process, which naturally tends to *increase* the surface area. Therefore it is obvious that when the wings are actuated in the manner described, uplifting force is enormously developed.

Presuming the above description virtually correct, we understand how a bird rises from the ground ; the angle at which it rises, however, depends on the species, and also on the nature of the place it happens to be in at the time. For instance, a woodcock, surrounded by dense covert, rises perpendicularly until clearing the tree-tops, and does so with great rapidity. Duck, especially teal, fly straight up from a reed-bed, or from water overhung by trees.

On the other hand, a swan, like an aeroplane, must " taxi " along the surface before it can rise. The reason for this is that the weight of the bird counteracts any attempt at a spring from the water in the first instance, consequently the wings lose half their lifting power by coming in contact with the water ; but once clear it takes an upward inclination, though this bird can never rise directly above a certain angle on account of its weight.

Having got the bird well up into the air by means of the uplifting power of the wings, it now behoves us to investigate the secret of forward momentum.

Progression through the air, in my belief, is acquired in three ways, viz., by undulating flight on outstretched motionless pinions; "coasting" flight, and flight resulting from wing action only; the latter being the ordinary flight of the generality of birds.

Undulating flight on motionless pinions is confined to "gliders," such as gulls and others. Several species of the gull tribe, without stirring their wings, are capable of following, and even overtaking, a ship against a head wind, and I have little doubt that a gull or other "soaring" bird, on attaining a certain altitude, has the power (not that it uses it) to travel in this fashion indefinitely. Undulating flight might be compared with the "switch-back" system, only more so, because in the bird's case, the impetus gained by the downward slope, aided by the wind, suffices to bring the "glider" back to the same level, or even above it. This, however, is "gliding"; flying directly through the air is another matter.

When ducks, geese, plover, etc., are seen overhead, travelling to some distant spot, the

G

birds are then flying on a level plane (parallel to the earth), the action of the wings is continuous ; should, however, one or more of the birds show an inclination to " coast " it is a sure sign that the " flight " is about to descend, otherwise the wings never cease beating the air. Therefore it is obvious that forward motion results directly from the wing action independently of " gliding " or " undulating " ; in which case, the wings, for the time being, are out of action and serve merely as supports.

Now we have to consider how this beating of the wings engenders propulsion ? On again examining the wing of a bird, we observe that the " plumage " gradually tapers away from the " arm " to a thin marginal edge defined by the extremities, in juxtaposition, of single feathers, spring-like and resilient. We have already seen that when the wing is lifted (up-stroke) it meets with practically no resistance, therefore it is the down-stroke which counts.

Now, by way of experiment, we shall imagine this wing actuated from the shoulder in the natural way, straight up-and-down, but from a stationary body. The effect upon the air, which can be tested, is that a draught is set up which flows away from *behind* the wing at each successive down-beat ; in short,

the wing displaces the air in the same way as if it were a fan—a fan, however, so constructed as to work with a single or one-sided action. When the wing or pair of wings are thus set in motion at high velocity, it is easy to understand what the result must be when these wings are attached to a *free* body, light and so shaped as to present the least possible resistance to the air.

Flying on a level plane, unaided by the wind, a duck travels at the rate of, say, 50 miles per hour ; this is the limit of the bird's flying powers which can only be accelerated by the assistance of a favourable wind. Conversely, the flight is retarded by an adverse wind. Speed is again accelerated when the bird, still using its wings, leaves the mean level and flies earthward ; in this event acceleration is due to gravitation. But the test of the wing-driving power is what a bird can do on a level plane without assistance from the wind. Flying at an angle *above* the mean level reduces speed inversely as the angle of inclination becomes steeper. It must, however, be understood, that though the wings are now *lifting* as well as propelling the bird, their position and scope of action in relation to the body is still, as always, the same. Like the paddle-wheels of a steamer which act in concert

and keep in line with the sides of the ship, however much the latter is tossed and rolled about, so it is with the wings of the bird ; these do not twist in their sockets, but keep the same alignment whatever the emergency. It is not the wings, but the body of the bird which changes position, inclining upwards or downwards, as the case may be. To acquire lifting power the body of the bird must be tilted in an upward direction. When flying on a mean level lifting force is neutralized and the wings act as fans.

Undulating, apart from " gliding," is a style of flight common to many of the smaller birds. Alternately using and closing the wings, the bird sweeps along in wave-like undulations. As the wings are folded the bird falls slantingly and is thus carried on in the same direction until the wings are brought into action, when again it slopes up to the former level, or any level required. This is a speciality of flight exactly adapted to these (perching) birds' requirements ; for it will be noticed that a bird with undulating flight comes to its perch with an upward sweep and alights the moment the energy is spent. Provided the perch is stable the bird comes to rest without a flutter—without overbalancing by so much as a hair's breadth. Such wondrous precision and

poise is only possible to these natural equilibrists who have not to think about their actions, but who are inspired by infallible subconsciousness. Once a bird began to consider distances and to calculate the effects of gravitation, etc., like a human being, it would have to learn by practice how to do these things ; moreover, some would prove less proficient than others, whereas we observe in nature that birds on gaining their full powers are, one and all, faultlessly perfect in their manifestations, whatsoever. The slightest failing means prompt extinction of the individual.

Woodpeckers are, perhaps, the best exponents of undulating flight. The green-woodpecker (*Picus viridis*) is the largest British bird to fly in this fashion, and can always be identified by its flight independently of its brilliant plumage. One has only to watch a bird of this species flying from tree to tree, to see how admirably the flight serves to bring it perpendicularly up against the bole of the tree. In no other way could the bird possibly arrive in such a position with the same grace and precision. To fly directly up against the tree would be a clumsy proceeding and detrimental to head and wings ; but as it is the wings are folded out of the way *before*

the bird reaches the tree, the impetus carrying it up to the spot. On gaining the tree the woodpecker remains for a moment immovable and rigid, when it has the appearance of a natural excrescence projecting from the tree.

I have used the word " coasting " as applied to a certain description of flight. By " coasting " I mean straightforward flight on motionless wings after momentum has been acquired. For example, partridges fly and " coast " alternately ; a very graceful flight shared only by birds of the same order. Partridges, without moving their wings, sometimes " coast " for long distances ; flying in this fashion they will rise at and clear a hedge, to sink again on the opposite side. To effect this undulatory movement the bird has only to incline one degree above the mean level on approaching the hedge, and after clearing it, reverse the order. Proceeding in this way the covey skims over the field and alights on the further side ; but the mode of pitching is very different to that of perching birds. In the case of partridges, birds of some weight, the momentum up to the last moment is considerable, and must be summarily checked to allow of an easy descent. There is no discussion amongst these partridges as to where they shall settle ; for as already suggested, the birds are linked

by telepathy : for the time being their mind-units have merged in one mind. The covey, therefore, rises simultaneously, flies in a body and settles as one bird. (It is needless to go into exceptions, for which there are always incidental causes.) Each succeeding act is performed as it might be by a single bird. Naturally this is a mental attitude the independent self-conscious reasoning mind has difficulty in grasping, but it must be grasped before we can see nature as she really is. Thus we observe the partridges in the distance simultaneously "throw up," almost vertically, flutter with their wings and drop lightly on the ground. Whilst fluttering in this upright position the wings act as a powerful brake against the air. An observer following the line of flight in open country, after losing sight of the birds, will again "spot" them as they pitch ; because, for the space of a moment, all the birds present a *full view* of the upper surface of their persons—back, wings and tail.

CHAPTER XII

INSECT FLIGHT

WHATEVER may be said of birds, it is certain that insects cannot look to their progenitors for instruction, seeing that the latter, for the most part, have long since crumbled into dust ere their offspring take wing. And yet insects exhibit wonderful powers of flight, equalling if not surpassing the flight of birds. Some of these insects on emerging, not only fly straight away, but within the space of a few hours carry out their chief mission in life, which is to deposit ova ; not at random, but in suitable places, so that when the time comes round again an identical batch of insects appears in the same spot, and so on from year to year. Subconscious intelligence, exact and punctual, leaves nothing to chance.

Insect flight appears to be on the same principle as bird flight. The wings are moved in the same way, only, in most cases, much more rapidly ; but the construction of the wings is very different. The " arm " in this

case is not really an arm, but a process of chitinous nervures which forms a stiff margin (the costa) ; this gives great rigidity to the wing. These nervures spread out in a network of veins which taper gradually to the hinder margin, and being curved act under pressure in the same way as the quills of feathers, and are equally resilient. Thus, when the wing is waved or vibrated, the result is practically the same as in the former case : viz., that the air is " fanned " away in the rear of the wing, which engenders propulsion or lifting power according to the angle.

The costal margin of an insect's wing is rigid throughout, except in the order Coleoptera and a few others where a joint shows on the costa ; this has nothing to do with flight, but is merely an adaptation which permits of the wing being folded so that it may pass under cover of the elytron when not in use, the cover being too short to contain the wing in extension. For the greater part, insects are furnished with a dual flying apparatus, a fact which seems to suggest that their ancestors belonged to a period long anterior to birds. The system would appear unnecessarily complicated, for though these double-winged insects exhibit high powers of flight, as instance the humming-bird moth (*Macroglossa*

88 HIGHLY SPECIALIZED FORM OF FLIGHT
stellatarum), yet they are rivalled by insects possessing only a single pair of wings. For instance, there is a dipterous fly (*Bombylius*) which, in its mode of feeding, poise and flight, exactly resembles stellatarum in miniature, and produces the same humming sound, but in a higher key.

I am inclined to think that this flight of *Bombylius* (three British examples), which is identical with that of the humming-birds, some of the hawk-moths and the hover-flies, is a form of flight distinct and more highly specialized than is observed in any other classes, albeit there are some inferior imitations. The speciality of this flight lies in the fact, I believe, that the rate of wing vibration is constant, whether the insect, or bird, is stationary, as when poising over a flower, or travelling at excessive speed.

A hover-fly, for instance, suspended in mid-air, remains absolutely stationary though its wings are vibrating with such velocity as to render them practically invisible. Suddenly the fly darts off so rapidly that the eye can scarce follow, when again it returns to the same spot. Like the flight of thought, a moment here and then away, regardless of time and space. But though the spirit that prompts these ethereal excursions is itself

WING OF BIRD.

BOMBYLIUS (DIPTEROUS FLY).

[Facing page 88.]

ethereal, the wings and body of the creature are material, and therefore should be open to investigation.

Thus, we will suppose that the wings of the hover-fly, like all other wings, move with a straight up-and-down action ; but, in this case, they move at the rate of, say, 400 vibrations per second (a low computation). Enormous energy is thus developed ; but the fly has such perfect control over it that, whilst careering at infinite speed, it can check itself instantly and remain stationary in mid-air with the engines, so to speak, still running at high pressure.

When so stationed in mid-air, the insect's body is on the mean level, therefore there is no lifting force. But in the ordinary course the insect in this position should be driven or " fanned " along in a forward direction ; but it is not, it remains stationary ; because, I believe, the motive power has been neutralized by a slight alteration from the normal in the position of the wings. That is to say, the wing-points are directed slightly *forwards*, which causes the air to flow off *laterally* instead of in the rear of the body ; forward tendency is thus counteracted, and consequently the insect hovers in a neutral position, moving neither backwards nor forwards. But the

moment the wings are inclined, ever so slightly, in a backward direction, motive power is engendered and, without wing acceleration, the fly darts off into space.

One can understand that a very slight alteration in the set of the wings is sufficient to effect these movements. The hover-fly is capable, not only of poising, but can turn without moving from the spot, or advance slowly and cautiously ; and again, what is more extraordinary, the fly is capable of moving *backwards*. This indeed is a feat possible only to creatures possessing "high pressure" flight, which includes genuine humming-birds.

I am unable to speak from personal observation, but I imagine that a humming-bird is also capable of coming out backwards from a cramped position, say, a tubular flower-head (?). The act of retrogression is never continued beyond the actual necessities of the case, but may be distinctly observed in respect to bombylius ; the hawk-moths (*stelatarum*, *fusiformis* and *bombylifomis*) ; and almost certainly in the cases of the larger hawk-moths (*celerio*, *elpenor*, *convolvuli*, etc.) ; but as these fly at dusk it is difficult to take reliable observations. According to my theory, backward movement would obtain

IN TUNE WITH ITS SURROUNDINGS 91
when the wings are set a degree in advance
of neutral.

The marvellous precision and *fitness* of these actions can only be attributed to Omniscience manifesting in the creature, which, indeed, is no meaningless expression ; for however faulty and inadequate my description, the fact remains, the hover-fly is in perfect tune with its surroundings which shows it to be no mere waif struggling with the elements, but as much a part of nature as the sun in the sky.

CHAPTER XIII

PRODUCTION OF SOUNDS BY CREATURES IN THE ANIMAL WORLD

IN pursuit of his study the naturalist relies equally on his sense of hearing as on that of sight, indeed more so, for the innumerable sounds of nature are borne in upon his ear from near and afar, and, whereas a man sees only in front of him, he is capable of hearing in all directions. Thus it is often a sound which first attracts his attention ; either the direct utterance of some creature or sound produced by its movements.

Training and cultivation of the auditory sense is of the utmost importance ; therefore, the true naturalist makes it his first endeavour to familiarize himself to all kinds of sound until the practice becomes an acute subconscious faculty ; he is then in a position to know a great deal of what is taking place around him, and of the kind of life that exists in his vicinity.

Few creatures in the Animal World are absolutely mute, though it may be that we

are not able to hear all of them. Among air-breathing vertebrates I do not imagine there exists any one that cannot, on occasion, produce some audible sound ; still, there may be cases which have not come under notice. For instance, the writer has no record in respect to the jack-snipe (*Scolopax gallinula*). Though silent throughout the winter months, it is very unlikely that this bird is incapable of utterance.

Though no actual language obtains in the Animal World, there are expressions which almost amount to it, sounds that convey different meanings and which are acted upon accordingly, albeit unconsciously. Thus, we clearly distinguish call-notes, notes of alarm, notes of pleasure, notes of distress, and again, notes of joy. These latter, in the case of birds, take the form of *song*, perhaps the most wonderful exoteric expression of spiritual beatitude in all nature. Furthermore, the songs of birds are spontaneous and diverse, according to species ; a phrase neither borrowed nor acquired, but proceeding spontaneously and subconsciously from the Infinite, which is Love, Beauty and Truth.

The songs of birds—at any rate, some of them—are distinctly melodious, and appeal intensely to nature-lovers. This may arise from the *purity* of such music, which links us

(humanity) directly with the Divine. For one ecstatic moment we seem carried beyond the mundane plane of self-consciousness and launched in the realm of Reality. A like sensation is experienced when contemplating the marvellous beauty and perfection of flowers, which is the same though silent expression of spiritual ecstasy. This “splendid occasion,” beyond words to express, will, nevertheless, be recognized by many who can recall similar experiences, and who know that it does not occur on every occasion when looking at a flower or on hearing a bird sing. No, it is only when the conditions are right, the “intangible connections” complete, that it occurs, and then instantaneously ; for this glance “behind the veil” is *within* (subconscious), and not subject to time and space.

A very curious fact in nature, as it seems to me, is that her joy-notes are, by no means, all of them vocal ; there is a great deal of what might be called “instrumental” music, especially among insects. Insects have nothing corresponding to the human ear, yet it is certain they appreciate sound ; moreover, sound vibrations which, as regards pitch, far exceed our sense perception. The antennæ no doubt are the organs for intercepting sound, also scent and other frequencies of which we

have no knowledge. The "humming" of wings, "ticking" and "rasping" (*Cicadæ*) are all of the instrumental order; so also is that peculiar "squeaking" produced by the hawk-moth (*Acherontia atropos*): all these expressions are significant and have their uses in nature.

Then, again, there are many birds, including foreign species, who "play" instrumentally. Woodpeckers of various kinds make use of a sounding board, a specially selected portion of a hollow tree which, on being struck by the bird with its bill, gives out sound like the "roll" on a drum that can be heard half a mile away on a still day, but though loud-sounding is extremely difficult to locate. A person unacquainted with this sound would never imagine it to proceed from a bird, and in the case of the lesser-barred woodpecker, a very small bird at that. How the "beats," which cannot be less, and may be anything over 16 per second, can be tapped out with such amazing celerity, is a mystery.

The "bleating" of snipe (*Scolopax gallinago*) is another most remarkable example of serenading, and as to how it is produced is still undetermined.

The writer, who has availed himself whenever the opportunity offered for taking obser-

ventions on this point, is convinced in his own mind that the "drumming" emanates from the wings of the bird, and not from the tail, as is often maintained. But as the snipe is usually high up in the air when this performance occurs, it would be rash to make any definite assertion. However, when closely following the bird in its course with field-glasses, it will be noticed that, as the sound is heard, the snipe is seen to dip earthwards, almost in a falling position, with wings spread, though somewhat retracted; at the same time the wings quiver, not from muscular action, for, at the moment, they are stationary and rigid, but from the force of air-pressure which is driven *through* the primary wing-feathers, the result being that the "primaries," stiff and resilient as steel, *flutter* and so cause the "bleating" sound we hear.

Now, on the other hand, the tail feathers of a snipe are extremely weak, and therefore would hardly respond to such treatment. The point, however, will probably remain a matter of individual opinion, as it is unlikely we shall ever get nearer the "bleating" bird than has already been achieved. Nor is it of real importance; sufficient that we can hear the sound and know it to be produced *instrumentally* and not vocally.

Though the cause of these subconscious manifestations is practically the same in all cases, the "drumming" of the snipe is executed in a fashion entirely different to the wing-drumming of some other species; these, however, I shall have occasion to mention later on, when referring to gallinaceous fowl.

Whilst on the subject, and as a personal note, I would appeal to naturalists to give close attention to two British species with a view to discover whether their love demonstrations are vocal or otherwise—viz., the Corncrake (*Rallus pratensis*), and the Nightjar (*Caprimulgus*). It may not have occurred to anyone that there can be a question on the matter, but, personally, I am not satisfied that these expressions are vocalized, and though I have pushed investigations as far as possible, have had no satisfactory results. My nearest approach to success was in the case of the corncrake who, on the occasion, was "rasping" on the top of a bank. By crawling for a long distance up a wet ditch I succeeded in getting within a few feet of the bird, when it seemed to my fancy that however the sound was produced, it was not vocalized. On raising my head to a level with the top of the bank the "rasping" immediately ceased, and so, unfortunately, the attempt failed.

In the case of the nightjar the difficulties are still greater, for the would-be observer is more or less hampered by obscurity.

In conjunction with vocal and instrumental sounds, some creatures perform very wonderful, not to say grotesque, antics, and "dress up" to enhance the effect. Contrary to the human fashion, it is invariably the males who wear the "fine feathers" and "strut" and even "dance" in order to show themselves off to their less resplendent partners who, in the meantime, appear supremely indifferent and unconscious, which, from their unreasoning point of view, they undoubtedly are.

All such displays are rapturous, subconscious manifestations of nature at the zenith of her perfection—the love season when the Force-of-Life is exerted to the full and results in *reproduction* or the furtherance of the life-principle in yet another generation.

CHAPTER XIV

NATURAL PROTECTIONS

IN order to make clear my impressions in regard to the subconscious mind in the Animal World, I shall now give some details of natural history well known to sportsmen and naturalists, but which I consider evidential in support of my theory.

Wild life may be divided into two classes, viz., Exposers, creatures who frequent the open (land and water) ; and Concealers, those who make use of covert of all kinds. Each class has its particular schemes for protection. Thus, Exposers depend on keenness of sight, locomotive powers, weapons of defence and warning colours. Concealers, in hiding themselves, mimic the surroundings. Some creatures, however, adopt the schemes of either class, according to season and circumstance. Amongst these are Wild Duck (Mallard).

For the greater part of the year these birds

live mostly in the open, where both sexes are conspicuous; they then assume a wary attitude and are unapproachable. But as spring comes round the mated couple change their habits and locate themselves in the vicinity of covert. The duck, who alone is concerned with the nest, has already the plumage suited to her surroundings; therefore, whilst she is occupied with domestic cares, the mallard retires under cover of reeds and rushes, and by the time the brood has attained the "flapper" stage has so altered his appearance as to be scarcely distinguishable from his mate.

Curlew, golden-plover and other shore birds are very conspicuous when standing out on the sands, but amongst the heather and moss, where they breed, their plumage harmonizes perfectly with the surroundings.

In these cases the birds, erstwhile Exposers, adopt an attitude of concealment.

Ducks and other aquatic fowl frequenting open water make no attempt at concealment, but depend, in the first place, on their power of sight, and as they usually keep together in company, the advent of any suspicious object is at once detected. When this happens there is no panic, for the birds are subconsciously aware of their security. Acting in a deliberate

SIMULTANEOUS COMPANY MOVEMENTS 101
manner, they keep their distance by swimming or diving from the pursuer until unduly pressed, when, simultaneously, they take to flight and so outmanœuvre the enemy.

The same applies to land animals and birds inhabiting bare tracts. At the approach of danger these stand motionless and erect. After maintaining this attitude for a moment or two, the whole body moves off (or rises) *simultaneously*. This spontaneous action is very remarkable, and obviously the outcome of a scheme for protection.

Company movements of birds and animals may be compared to the practices of a well-drilled squad of soldiers, whose units combining produce that uniformity of action essential to operations, offensive, defensive or protective. In the case of a body of men, combined action would be impossible without the command words of a leader ; the actions that follow the words of command are due to his (the leader's) individual mind. It is generally supposed that animals and birds are actuated in much the same way ; namely, the signals of a leader. But once admit this and there is no alternative but to believe that animals have reasoning minds, if not equal to, at least on the same plane as our own. The writer's belief, already expressed, is that animals

(speaking generally) have no reasoning mind.¹ If this is so, there can be no leaders in the true sense of the word. The only approach to such a condition in wild nature is the case of young who follow their parents, and a train of females headed by an old male. But this is merely a natural tendency of the weak to follow the stronger, and amounts to nothing beyond the simple act of following.

I shall now bring evidence in support of this belief, viz., that in wild life there are no leaders in the true sense of the meaning. (The functions of a leader can only be understood in relation to an intelligent reasoning mind.) Indeed it would be difficult to imagine that the countless hordes of locusts and myriads of lepidoptera, seen on migration, are influenced by leaders. However, to go more particularly into the matter we shall consider the doings of the duck tribe, plovers and others.

When on long flight these birds range themselves up in a > shape figure, with the result that a single bird heads the party at the apex.

¹ "Some of the higher animals" (dogs, apes, horses, etc.), "who for a long period of time have been closely associated with man, have through his mental emanations acquired some faint reasoning powers." In such cases it is possible that the discarnate spirit of the animal does not return to the group-soul but remains individualized.

Therefore, in these cases, if there is a genuine leader amongst them, this undoubtedly is the one.

Now in the event of this bird being suddenly cut off (shot), what happens? Simply that after the disturbance is over, the "flight" resumes its former configuration with another bird at the head and so continues in the original direction. If we believe that the former bird had all the qualifications of a leader—was, in fact, superior to the rest in intelligence and bird tactics—it must be admitted that the next best has been put up by general consent and presumably prior arrangement. The only conclusion it is possible to arrive at from this argument is that the birds have reasoning minds of a high order, which brings us back to the old standpoint. But, on the other hand, let us regard the matter from the mind-blending aspect. In this case, the mind-units composing the "flight" are all equal; what mentality they have is subconscious and telepathically connected. The result is automatic action of the "flight." The units act and move as one bird, because they are actuated by one mind.

(According to my theory, mind-blending may be explained in this way: Take a globe of

quicksilver which shall represent All-Mind (1). From it detach a globule which we will call a group-soul (2). From this globule again separate a small portion and break it up into fifty minute spheroids which shall stand for individual mind-units—of a flock of birds—(3).

If two of these metallic globules (3), which are of the same constituent substance and have an affinity for one another, be approximated, they are seen to coalesce immediately ; or all of them, collectively, will merge in one globe (2), and that again into the original sphere (1). The fact of dividing the substance in no way alters its nature.

And so in the case of the birds : When incarnated the subconscious mind is separated into units. These units, set apart from portions of the One Mind, have the strongest affinity for one another, and when in proximity are drawn together, and so become telepathically united ; at the dissolution of the body they merge in the group-soul.

This, indeed, is the basis of my theory of telepathy as a potential factor in the Animal World, and when all the evidence contained in these pages, bearing on it, has been considered, I think it will be admitted that my proposition is not unreasonable.)

Thus, when rising from the place of departure the birds, irrespective of sex or age, fall automatically into the “ wedge ” shape which is the natural scheme for minimizing air or water pressure, a system manifest throughout nature. It is plainly indicated in the head and shoulders of a fish. When constructing a ship man adopts the same principle as obviously the only means for reducing pressure of the elements—air and water.

The travelling birds and sailing-ship are, indeed, somewhat alike in this respect, for both have “ figureheads,” but in neither case is the head responsible for the guidance and governing of the body.

The goose has never been famous for its intelligence, but, collectively, as a “ gaggle,” geese have sense enough to fly in the “ wedge ” formation ; they invariably do so, and at the same time keep up a continuous gabbling (“ honking ”) (*A. albifrons*). This is not the call of a leader, for they all do it, and the sound is like a pack of hounds in full cry. This habit, which I believe is purely automatic and unconscious, serves to keep them together—within the zone of telepathy. The same may be said of the aforementioned “ pack.”

Geese and ducks are very conservative in

their mode of flight, and for this reason can be identified when still a long way off. But for perfect conformity of action in the execution of aerial evolutions, plover bear the palm. Golden-plover, when seen at a distance over their feeding grounds, appear as a misty cloud against the sky, sometimes darker, sometimes lighter ; the change of shade is effected instantly. As the mass wheels and turns about, the light underside of the wings is flashed up and so contrasts with the darker plumage. This effect, which would not be noticeable unless the compact body turned as one bird, may be traced after the " stand " is practically out of sight. Now watch the plover at a closer range and note how each bird keeps its place whilst the massed body is twisting and turning into all kinds of shapes. Now they are seen to rise in the air to a great height ; fly on a level plane ; plunge suddenly earthward ; skim along over the surface of the ground, rise again and finally go off in the V formation.

Although these manœuvres are executed at incredible speed, there are no collisions, no bungling as must surely occur if each out of, say, 200 birds was acting on his own and endeavouring to fly even conformably with a leader. It is an amazing sight, calculated to

leave an impression that, in nature, nothing is impossible.

In the bird kingdom, as elsewhere, we note that some species are better bred, so to speak, than others; their habits are more refined. These are clean feeders, whose costumes are compact and well fitting; the very texture thereof is of superior quality. These, indeed, belong to bird aristocracy. Of this class are plovers and their congeners, whose nervous system, no doubt, is correspondingly taut and responds readily to subconscious impulses.

Some of the smaller shore birds, such as stints, dunlin, sandlings and ringed-plover, are models of elegance, so spick-and-span is their plumage. The flight of these birds is comparable to that of the plovers last mentioned. When alighting on the shingle the birds mingle with the stones, so that it is difficult to distinguish them from the surroundings. Thus, with heads all turned in the same direction, they stand rigid; on the slightest alarm they rise instantly and are off again. But when all is quiet the birds are seen to disperse, running hither and thither over sand and stones in search of food and, in this way, become separated to some extent. It is then, I take it, that the bonds of telepathy are relaxed, when each bird acts for himself.

When it is time to move on to fresh ground, or an intruder is sighted, one or more of the birds rise ; the rest immediately take wing, when the lot converge and sweep off together as before. But the movement is not in response to a leader.

Though I believe telepathy is general throughout the Animal World, mind-blending, in regard to flight, does not include all gregarious birds, for it is not, in all cases, necessary as a protection.

For instance, rooks, who go about in large flocks, have no system of flight. Keeping one another in sight they fly in a careless, slovenly manner ; the most casual observer cannot fail to notice the difference between the rhythmical evolutions of plover and the clumsy flight of a flock of rooks. Rooks are essentially " Exposers," they make no attempt at concealment ; on the contrary, with much clamour and a conspicuous appearance, they freely advertise themselves to the country round for what they are worth, which, as prey, is practically nothing ; for with tough coarse flesh surmounted by a covering of strongly adhering feathers, rooks are little sought by man or predaceous birds. In fact, their worthlessness is their safety. But a sub-order (*Corvidæ*), viz., starlings, are remarkable

for their orderly, mind-blending flight. No matter how large the company—it is often beyond calculation—the flight is executed in perfect order ; but, again, there is nothing to indicate the presence of a leader.

CHAPTER XV

CONCEALERS

Now we shall take a glance at "Concealers," such as game birds, whose habits are best generally known. Grouse, partridges, quail, etc., dwell together in family parties and, as might be expected, are in close telepathic sympathy. The parents in these cases naturally act as guides to the young brood (say, partridges) until the former's career is cut short by the sportsman. The old birds are generally the first to fall; incidentally, because being larger they attract the eye of the gunner, and, purposely, they are often shot in order to keep the covey from becoming wild. Thus, by the end of September, the brood is often without parents to look after them. When this is the case the young birds, having no reasoning mind, cannot and do not appoint a leader, but act together automatically.

In imagination, let us watch the sportsman as he enters a field of clover in pursuit of such

a covey. On becoming aware of the enemy the birds' first impulse is to conceal themselves. Under the circumstances (high clover) this ruse is simple enough, and would probably succeed were it not for the man's clever assistants, viz., his dogs, who indicate the position of the covey. Whereupon, an advance is made in their direction. Concealment now no longer availing, the alternative is flight. The birds rise *simultaneously*. One or more fall, but the rest carry on together, and are presently marked down and followed up by the sportsman, when, again, the same performance is repeated ; though hidden from one another, they spring simultaneously into the air. It does sometimes occur that one or, perhaps, two birds remain to rise a few seconds after the others have fled and get safely away, for it is at this moment the sportsman is engaged in reloading his gun. However, if the observer has carefully noted the relative positions of the birds, he will find that the laggards were squatting a certain distance *away* from the main body ; they were, in fact, *outside* the zone of telepathy.

But to follow the remnant of the covey : By this time—after the second rise—the birds are fairly scared and scatter to some extent, so that when the sportsman comes up with

them again they are seen to rise separately, in ones and twos, for now the birds are no longer linked by telepathy ; each, therefore, must shift for himself, a shift which is not to the advantage of the partridges, for it enables the sportsman to take toll, possibly, of the whole covey.

No group, perhaps, is more closely associated than a covey of partridges. If not interfered with the parents and their brood live together till the pairing season comes round. They feed in company, rest during the day together, and at night "jug" in the grass or in some declivity on a bare field.

Partridges and grouse are so constantly harried and driven about that coveys get mixed up, when they are said to "pack." Through man's interference this habit has probably been acquired ; but, in any case, once coveys have joined forces, the birds are telepathically united.

The common belief is that a pack of grouse (or partridges) is under the leadership of a single bird—an old cock, who keeps watch and "crows" his orders ; but this, I think, is going beyond the facts. Amongst a pack there will be several old cocks, any one of which, on the approach of danger, will give the alarm ; though not the signal of any

particular leader, it is a warning to the rest to run together preparatory to taking flight.

Game-birds are naturally well protected, for besides the telepathic faculty which holds them together, the attitude of concealment is enormously helped out by colour resemblance, a natural scheme known as "protective coloration and mimicry of surroundings."

In the insect world this scheme is elaborated and perfected to an incredible degree; not only are spots, blotches and shades of colour truthfully matched, but the creatures mimic the actual forms and shapes of the surrounding inanimate objects.

"Concealers" are subconsciously aware that, to keep up the deception, a rigid posture must be maintained. In the case of partridges, if the observer's eye is keen enough to detect them on the ground, he will see that the birds lie inert, seemingly as lifeless as the stones and clods which surround them, nevertheless they are in telepathic touch with one another, so that the moment flight becomes necessary they spring together *as one bird*.

The same mind-blending scheme is manifest in some gregarious animals. For example, a flock of sheep, when alarmed, immediately herd together; they do not (in my opinion) rally round a leader, but mass together in order

to unite mentally, afterwards manœuvring as urged by subconscious mind.

Sheep inhabit bare and open tracts, and are therefore "Exposers." Their powers of locomotion are below the average of animals found in exposed places; also the sheep's fleece is an encumbrance which tends to reduce speed. However, I believe this woolly covering which envelops the body is a natural protection against the attacks of beasts of prey rather than for the actual warmth it may afford the animal, and which takes the place of spines and other kinds of defensive armour as observed in some species: thus, when the pursuer, in the shape of a wolf or other, overhauls the quarry, his teeth meet, not in the flesh of the animal, but in the wool, which comes away entangled in his mouth and for the moment blinds him, thus affording the pursued a chance of escape. But the sheep's chief protection lies in this habit of massing together when danger threatens. There is "safety in numbers."

Now observe the sheep after they have crowded up: their heads are all turned in the direction of the supposed danger. For a moment they stand motionless; then, with one impulse, the whole troop stampedes. Suddenly, they are seen to slew round and

halt, partially facing the direction whence they came. Again they start off at a tangent; but this time a small ditch or bank obstructs their passage, whereat the foremost animals jump; at the same time the rest are seen to "buck" off the ground, though the obstacle has not been reached or even seen by those in the rear. "The fact has been telepathed?" Yes, but not by a leader, for were the sheep to face about and charge in an opposite direction, as often happens, so that the rear-most are now to the front, the same performance is repeated. Once massed, the units composing the troop are no longer independent members, but the whole is governed by one mind and one eye: not the eye of a leader, but the eyes which first perceive the danger or obstacle of which notice must be taken.

Though this faculty is a scheme for protection, it is sometimes, in the case of sheep, the cause of their complete destruction. For if during a stampede one or more chance to overstep the brink of a quarry-pit, the rest inevitably follow.

The cause of stampede of horses and panic in a human crowd is, I believe, due to the blinding and prompt action of the subconscious mind. Man, like the animals, is affected

because his subconscious mind responds to the emergency *before* his reasoning faculty has time to assert itself, before he has time to think. When the latter is reinstated the panic-condition subsides; but animals, having no reasoning mind to correct the initial impulse, run amok until exhausted.

If, amongst the crowd of human beings, there is one who has not been seized by the general panic, it is that he has himself well under control. As the saying goes, the man "kept his head," which means that his will-power was strong enough to restrain his ego from merging or blending with the panic-stricken.

The "psychology of crowds" is a different thing from the aggregate psychology of all the individuals of which they are composed.

NEST OF THRU'SH
(*Turdus musicus*).

CHAPTER XVI

QUICK RESPONSE OF SUBCONSCIOUS MIND

A REMARKABLE fact in regard to the subconscious mind is the rapidity with which it responds to the exigencies of the moment. This is particularly noticeable in the Animal World. The same thing is observed in humanity. For instance, when an unexpected loud noise occurs a person blinks his eyes, the eyes shut down instantly, seemingly of their own accord; the act is over before the individual has time to think of this precaution. Subconscious mind, however, realizes the necessity and acts with the utmost promptitude. We call the action "automatic" simply because it has not been reasoned out and ordered by the physical mind. But what slow working mental process is this compared with a mind capable of instantly responding when called upon and, moreover, doing the right thing to meet the occasion. There is an essential difference in these mental powers: the difference between the reality and the echo.

Now to consider subconscious mentation in relation to purely natural wild life. A fact which strikes the close observer is that the body movements of the creatures are characteristically peculiar to themselves ; compared with the human species their actions might be described as " automatic." The reason for this is that the animals are not self-conscious—they have no reasoning faculty ; instead, their actions result from a series of subconscious impulses set in motion by the physical senses (sight, hearing and " scenting " perceptions) ; the consequence is, quick and decisive motions, in some cases almost amounting to " jerkiness," only that the expression suggests lack of grace which, in fact, is not wanting.

There are, of course, slow-moving creatures who, from our point of view, appear ungraceful and even clumsy ; but this seeming imperfection is only apparent, for the creatures themselves are well adapted to, and in complete correspondence with, their own proper surroundings, otherwise they would not be there.

The particularity of action to which I refer is perhaps more apparent in birds than others, though all act, more or less, in the same way. For instance, let us watch the behaviour of a

thrush (a bird of high-class type) feeding on a lawn. Though its movements are in every way graceful, it advances by "fits and starts." Moving swiftly over the grass surface, it stops suddenly but without loss of equilibrium. With head turned slightly on one side, and with a pair of unblinking eyes, the bird presents a charming appearance of unconscious grace. In this posture it remains for a moment absolutely motionless; but though so still, the creature is instinct with life and intent on business. Again, we see it glide (so quick in the hopping action) over the lawn for a few feet in another direction, halt abruptly as before, and pause in the same rigid attitude. Then, quicker than thought, it has hold of a worm; a few dexterous tugs and the worm is drawn from its hole and lies wriggling on the grass, whilst the thrush eyes it with motionless complacency, knowing, subconsciously, that once out of the ground it cannot escape. In another moment the worm has been gulped down, or, in the case of a nursery, doubled up and retained between the mandibles in convenient form. After a supply has thus been collected the thrush, without a moment's warning, rapidly wings its way over the lawn and is soon lost to sight amongst the bushes.

Such is the behaviour of every thrush on

every lawn in the kingdom. All these birds are modelled exactly on the same pattern, and each is equally fit and in sympathy with its surroundings.

In *pure nature*, freaks and deformities do not survive, nor do I believe there is any real disease. Epidemics and disease are directly or indirectly the result of man's interference (overcrowding, usually), which upsets the balance, when nature is compelled to step in with drastic measures in order to readjust it. Hereditary disease and imperfections are not possible in pure nature ; if a creature is in any way defective (unfit) it perishes, because no longer in tune with its surroundings, therefore the evil is not perpetuated.

These alternate periods of activity and immobility observed in wild creatures result, I believe, from the very fact that they *have* no thinking faculty ; indeed, they are proof of it. During the passive state the creature is, of course, *thinking* of nothing, it is not even aware of its own existence ; at the same time, what sense organs it possesses are, as it were, set at "high tension," ready for immediate reception of external impressions, which, as they occur, are promptly acted upon, when the creature becomes as energetic as before it was immobile.

Birds are entirely dependent on their senses of sight and hearing; these faculties, therefore, are highly developed and, in many cases, specialized, as may be seen in the owl-tribe. The eyes of birds who feed and fly at night (Scolopacidæ, plovers, nightjars, etc.) are specially adapted, as also birds who obtain their food under water (cormorants, divers, grebes and others). On inspection the eyes of these water-birds are seen to be curiously modified to suit the density of the element in which they function.

The faculty of sight is all-important to birds, and it is this class (Aves) alone which is exempt from blindness in any degree. Truly, it may be said, the eyes of the bird are the windows of its soul. This, I believe, is practically the case, namely, that the bird's vision includes an all-round view, a fact that renders any attempt to "put salt on its tail" a futile undertaking. But, I question whether from the bird's point of view there is an angle of parallax—which is to say, that a bird is incapable of visualizing an object with both eyes at the same time. Obviously, this would be unnecessary to a creature that only requires to see, not to *concentrate*.

That birds such as woodcock, snipe *et hoc genus*, can see all round without turning the

head, is morally certain. The eye-sockets in these species, as is well known, are placed high up and far back in the skull; the eye itself, too, is very large and prominent. This modification is admirably adapted to the bird's mode of life. It serves two purposes: not only can the bird see in all directions, but the eyes so placed are preserved from the mud and water when it is in the act of "prodding" the ground.

The contemplation of nature's adaptations, so perfectly adjusted, gives one to pause. . . .

I have already made allusion to "natural equilibrists." It is a point deserving of special attention. The fact that creatures always maintain perfect poise and equilibrium shows them to be moving parts of a faultlessly working system. When, for certain reasons (overdevelopment in some particular), details of this great machine (nature) begin to lose their proper balance and become unworkable, they gradually drop off and disappear: such has occurred in the past. But those perfectly balanced remain, and function evenly and truly in accordance with the "mainspring." This is *pure* nature. But an offshoot, as it were, has sprung from nature which, in the course of time, has evolved self-consciousness

HEAD OF PHEASANT (p. 209).

HEAD OF WOODCOCK.

[Facing page 122.]

and, to a great extent, self-dependence ; but child-like and self-willed, it has not the knowledge of the parent, and therefore is constantly falling and failing, for want of equilibrium, *humanum est errare*. This is not pure nature, but *human* nature.

Now to consider this matter of equilibrium from a practical point of view. I can think of no better illustration than that afforded by the commonest bird of our country lawns—the robin. Here we have a confiding little bird whose proceedings can be watched at a close range in the open. Let us suppose the lawn set with croquet hoops and posts, though a single hoop and one post is sufficient, in fact, better for our purpose. To ensure steady sight the observer will take up his position in a chair placed sideways, in a line with the hoop and at a convenient distance. He will then keep an eye on the robin, who, in the meantime, is busy hunting for worms in the grass, and who, from time to time, is seen to fly to the hoop, or settle on the post, in order to take observations on his own account. Now this is a very ordinary sight which anyone in the least interested in birds has witnessed a thousand times, but it may not be everyone who has thought to concentrate his attention at the moment the bird alights on the hoop. If he

will do so, and at the same time keep his eye fixed on some mark in the background, he will note that the robin comes up, time after time, to exactly the same spot without overbalancing or exerting the slightest effort to steady itself, notwithstanding that it has come at the hoop with considerable momentum. The appearance is as though the "shade" of the bird had been cast on the hoop. In this position the robin remains motionless until, due to extraordinary power of sight, it has detected the head of a worm in the grass, when it flies off, settles on the ground, and approaches the worm in the same fashion as the thrush, before mentioned.

When alighting on the post the bird has not the same grip, but the poise is equally true. It will also be noted that the young birds, before they have acquired the red breast-feathers, are quite as efficient.

There are some birds, such as blackbirds, woodpigeons, magpies, etc., when coming to the perch, throw up their tails as if for the purpose of steadying themselves after having slightly overshot the mark. This action is deceptive, for it has nothing to do with equilibrium, but is an impulsive "display," and occurs slowly and deliberately after the bird has come to rest. This "show-off" is often

repeated several times before flight is resumed, and is observed more commonly during the breeding season.

The consideration of balance, as observed in the Animal World, is an important item in our study ; for though this instance of the robin may seem trivial, the case, nevertheless, is typical of nature—*i.e.*, “ Nature in her purity ”—perfect adjustment, perfect equilibrium.

CHAPTER XVII

ANIMAL INSTINCT DISCREDITED

IN these days it is the fashion to discredit animal instinct. With regard to "homing" pigeons, another correspondent to the *Daily Mail*, writes :

" They travel by sight and memory, and not by instinct. The fastest bird in the race covered 500 miles at the rate of 44 miles an hour. Whilst over land birds learn to mark the valleys and hills. Learning to fly over the Channel is a more difficult matter ; there is nothing to guide the birds, and hundreds are lost through not having pluck to make the crossing."

If this be so, and birds have no instinctive sense of direction, how is it that any single one succeeds in making the passage ? Yet hundreds do so, including so-called untrained birds.

Pigeon-racing being a national sport attracts a good deal of attention, and in this way the

public becomes acquainted with the fact that pigeons are capable of finding their way over hundreds of miles of land and sea, but whether by instinct or training it has no time to inquire. But when seriously studying these problems we must search through Nature's book. Here we find that the "homing" instinct, or sense of direction, is not confined to dogs, cats and a few others, but is manifested in a greater or less degree throughout the animal world, and is traceable in man. We speak of some persons having the "bump of locality," whilst others are not so "gifted." Like those "fitful recurrences" before mentioned, the power is subconscious, and the nearer we approach man's primitive state the more highly developed is it seen to be.

The savage has no difficulty in finding his way about in dense forests where civilized man, without mechanical aid, would certainly lose himself. Whereas the former is led by infallible subconscious mind, the latter must rely on his reasoning powers, which are liable to miscalculation; thus the man makes a mistake, loses his bearings, and having no sense of direction is helplessly at a loss.

In the face of overwhelming evidence to the contrary, it is difficult to understand how anyone can suppose that animals have no

instinctive sense of direction. Scarcely a day passes but we hear of some instance where a dog, cat or other animal, has found its way home after deportation under circumstances where it was impossible for the creature to have obtained a view of the passing country.

A case in point has recently come to my notice which is of unusual interest, and as the incident chanced to occur in a locality well known to me for many years, I am able to give an accurate topographical description.

The man from whom I have the particulars is a small tenant farmer in Carmarthenshire, who is in the habit of rearing a few calves, which he sends away by train to the markets.

On a recent occasion, Mr. Jones (they are mostly Jones in these parts) having tied up a six-weeks'-old calf in a sack, its head protruding from the mouth thereof, put the animal at the bottom of his cart and proceeded to drive to the station. Mr. Jones's farmhouse, be it understood, stands on the left bank overlooking the river. Leading from the farm there is a narrow lane which debouches on the high road. On emerging from this lane the farmer would keep to his left and drive up the valley for a mile, where the river again approaches the road. At this point a by-road strikes off to the left, and passing over a stone

bridge winds up to the station. Thus by the road to the station is about two miles, and from the station to the farm, "as the crow flies," say, a mile and a half. The intervening country consists of small fields enclosed by high banks with top-growth. There is also a large covert occupying most of the ground on the Cardiganshire side of the river which stretches up hill to the station. In fact, this wood is a game preserve having no thoroughfare, a rough bit of country cut off by the railway embankment at the top and hemmed in by the river below.

Now, on the occasion referred to, the farmer reached the station in the afternoon of the day, and after having consigned his goods left the sack containing the calf on the platform to await the train, and returned home, thinking no more of the matter.

Early next morning Mr. Jones's attention was attracted by bovine lamentations proceeding, apparently, from one of his meadows on the riverside, a field away up stream from the farm. Walking up the bank of the river to investigate the cause of the disturbance, he reached a "bushed" gate which divides these fields (upper and lower). Owing to a bend in the river the fields converge, leaving a narrow passage which is filled in by the gate.

Unless the gate is open nothing can pass at this place. Here then, on the wrong side of the gate, Mr. Jones, to his utter amazement, beheld the calf which on the previous day he had left tied up in a sack at the station.

That the animal had somehow struggled out of the sack and got clear of the place was quite possible, for until the train was due there would be no one on the platform ; but how so young a creature could have found its way over the ground described and crossed the river, as it must have done, is hard to imagine and will never be known. The fact of its being found in the field by the river proved that it could not have come there except in a direct line. Had the animal kept to the road, which lies half a mile or more back from the river, it could by no possibility have crossed the intervening land, which includes private grounds and gardens, besides some impracticable banks and hedges. Therefore there can be no doubt whatever that the animal, acting under nature's guidance, *proceeded in a direct line.*

To believe this calf mentally capable of recording landmarks from the bottom of the cart, or, for that matter, in any other position, is of course absurd. Were this incident the only evidence it is sufficient to prove that

creatures of the animal world possess an unerring sense of direction.

Had the converse occurred, viz., that the cow had so discovered her offspring, the occurrence, though remarkable enough considering the nature of the ground traversed, would have been less surprising.

The notion of a pigeon scrutinizing *en passant* the "hills and valleys" for future reference is indeed attributing to the bird faculties of a truly human order. At the same time, if we allow that pigeons have an innate sense of direction, the question naturally arises, why train them? Is training necessary? In the writer's opinion, training is necessary, for this reason: The birds, being captives and domesticated to serve man's purposes, are not living under *purely* natural conditions and therefore are not free to manifest their powers at their own (nature's) times and seasons. Instead, they are thrown up to find their way at any odd time and in any state of weather. The system from nature's aspect is irregular; in fact, it is another instance of the amateur meddling with machinery he does not appreciate and results in the upsetting of the equilibrium. Training, so far as may be, corrects this; not by inculcating or improving

a faculty already perfect, but by engendering habit—the habit of returning home immediately on being liberated, essential to racing purposes.

When a pigeon is liberated away from home there is no reason why it should return then and there. Though it generally does so, there is always the possibility that the bird may be attracted by likely looking feeding-grounds, such as cornfields, over which it is passing. Having alighted, possibly it meets with others of its kind, and so loses the inclination to return, and perhaps never returns at all. But that is not to say the pigeon has failed because *unable* to find its way. Training tends to reduce the chances of loitering.

Those who argue in favour of “ observation and memory ” maintain that, had pigeons a sense of direction, fog would not hinder them. No doubt fog has some effect on the birds : they are said to refuse to start in it, which perhaps is not surprising.

Fog has always a depressing influence, mentally as well as physically. It is possible, therefore, that subconscious perceptions are dulled by certain atmospheric conditions which may be sufficient to deter pigeons from setting out in foggy weather. It is certain, however, that having once made a start, birds

are not utterly baffled when overtaken by fog. I myself have seen "flights" on migration steadily pursuing a direct course through dense fog. Flying low, detached parties would come along at intervals and continue in the same direction as those preceding them.

The subconscious faculty known as "telæsthesia"—*perception at a distance, or power of vision passing the limits of time and space*—is, I believe, the explanation of what we understand by the "homing" instinct or sense of direction. Of this I shall have more to say later on.

CHAPTER XVIII

FROGS AND TOADS

WHETHER or not pigeons are capable of taking observations during flight, it must be admitted they have every opportunity for so doing. But to turn another page in Nature's book, we note the manifestations of a creature who has practically no outlook on the surroundings, yet makes its point, notwithstanding.

In early spring frogs and toads (the latter shun water except at the breeding season) make their way in a direct line across country to some pond or pool of water. When the country is enclosed these creatures are hampered by innumerable obstacles in the form of hedges, banks and thick undergrowth, yet nothing daunts them. From their low position in the grass the frogs can see next to nothing around them.

Some of these travellers have long distances to cover, and being slow movers take days to accomplish the journey. But with the exception of those (a large number) who succumb

to the attacks of predatory enemies, not a living frog or toad but finds its way to the water side. Where water is frequent there may be nothing remarkable in this, but if proof of the frog's subconscious power is desired, it may be had by anyone interested and with time to spare. He has only to keep watch at the proper season on a piece of water completely isolated, but known for a breeding place. If dry in the summer so much the better, for then it will not harbour possible frogs who might remain in or around it. Thus, at the appointed time (oftener at night), the batrachians will be seen converging from all directions. Now the frog's previous acquaintance (if any) with this pond cannot have been less than a year old, when it may have emerged from the same pond after completing the tadpole period. Following nature's usual scheme in this regard, it is possible that frogs return to the waters in which they were spawned; fish (*Salmonidæ*) are known to do so.

We note in this case that after developing legs the tadpoles (now frogs) are subconsciously urged to quit the water: they are seen hopping away from it in thousands when no larger than peas, and again, by the same power, are drawn back to it after a certain lapse of time. The action is as regular as the clock's pendulum,

which swings equally from either extremity. Truly nature's machinery is no less accurate.

The following is a still more remarkable instance of a creature whose innate sense of direction leads it to isolated water-holes of whose whereabouts it can by no possibility have conscious knowledge. This is the fresh-water eel, of whose life-history and mode of propagation nothing was known until quite lately. It was known, however, that eels inhabited rivers and ponds, and in these situations it was supposed they bred ; but no trace of the ova was discovered either in the water or in the fish itself, a circumstance which apparently gave rise to a quaint superstition, viz., that eels were produced from horsehairs ! Incredible as it may sound, such was the common belief even among educated people. The notion no doubt originated from the fact of the existence, in ditches and ponds, of a kind of water-worm (*Gordius aquaticus*) which has nothing to do with eels, but certainly has the appearance of an animated horsehair. However, it has now been ascertained that though eels live, it may be for years, in fresh water, they are really native of the sea. In order to propagate their species a certain proportion of eels go down yearly to the sea to spawn. In the spring, the young,

known as "elvers," find their way into the estuaries, and in countless thousands push up stream, some of them reaching the very source of the river. So strong is the subconscious energy in these thread-like creatures that nothing stops their upward progress; mill-dams, weirs, waterfalls, all are surmounted; where the elvers cannot swim they wriggle up over rocks and banks until gaining the water above. In fact, wherever suitable water exists, eels will find it, even though it be an isolated pond having no outlet.

The fact of eels being found in lone ponds in former times surprised no one, for it was presumed they bred in these pools; but now we know that to get into such places the eel can only come from the river. A small trickle or damp ditch is sufficient water-way, but if this is wanting the eel takes to the land, and with serpentine movement wriggles its way across meadows, travelling mostly in the *evening* or at *night* when the grass is damp with dew. Now that there are many more observers of natural history than formerly, these cross-country excursions on the part of the eel have frequently come under notice.

Literally this is a case of "a fish out of water"; nevertheless, the eel makes its point as surely as the frogs.

The true home, so to speak, of any particular species is the place where it is commonly reproduced. The so-called river-eel, therefore, is distinctly a sea fish which frequents the river for catering purposes.

Going back into the long past, we can imagine that sea-eels living in the vicinity of estuaries were attracted by a supply of food in the form of worms, etc., washed down to them at flood times. But as this influx would only occur occasionally, the expectant eels, it is natural to suppose, would acquire the habit of pushing up stream to look for them. After a time habit becomes fixed, and, eventually, hereditary ; and with change of environment differentiation takes place until the creatures are in every way adapted to their altered surroundings. In this way a new species comes into being and continues constant so long as the surroundings remain unaltered.

But notwithstanding the changed form and mode of life, the home of the eel is always the sea. Though countless ages have doubtless passed since first the eel began to explore fresh water, the subconscious mind never forgets, so to express it, that in salt water only can the species reproduce its kind ; hence the migration of eels from inland waters to the sea.

CHAPTER XIX

THE SALMON

Now the history of the salmon is just the reverse to that of the eel. Bred in fresh water, *Salmo salar*, notwithstanding the title, is a river fish which migrates to the sea for the purpose of obtaining food which the river cannot produce. When descending the river as a smolt (young salmon) it has no conscious knowledge of the sea, but is impelled in the right direction by subconscious mind, which also rules the time of departure.

Pursuing the same line of argument it may be interesting to trace, speculatively, the connection which undoubtedly exists between salmon and trout, and at the same time note how the subconscious force, like the reversing gear of machinery, needs but the touch of the "mechanic" to set the "wheels" revolving in an opposite direction.

Naturally, trout are fish of clear, swift-running streams; strong swimmers and of a bold temperament, they are admirably

adapted to cope with turbulent waters, such as the fresh-run salmon loves and stems with ease.

A peculiarity of the genus trout is that, relatively, the fish vary enormously in size, more so perhaps than any known species.

But this is wholly a question of food supply ; where the waters flow rapidly over a rocky bed, and no weed exists, fish food is scarce, and in consequence the trout, though reaching maturity, rarely exceed a few inches in length. Lower down the river, where the streams are quieter and aquatic weed abounds, the average size is much larger, including fish from 1 lb. and upwards ; in short, the richer and more abundant the food the larger the trout. When trout get to be of a certain age they are wont to neglect the usual diet of flies, worms, caddis, etc., for fish of all kinds, not excepting their own species. In these cases they grow to a great size, sometimes equalling the proportions of salmon. This being so, we can believe that trout having once got into the sea, where the right kind of food (fish fry) is abundant and procurable at a minimum of physical exertion, must quickly fatten up, and also that the effect of salt water would soon change the appearance of the fish. Now, a river that contains salmon invariably holds trout, and

the rule is, as we have seen, that the trout in the shallow, rocky streams at the head of the river, are small ; those in the middle sections larger ; and towards the mouth, where the water runs deep and meets the tide, the heaviest fish, known as "slob" trout, are found. These slob-trout, as the name suggests, are in the habit of moving up and down with the tide, and so get accustomed to the brackish water ; a plunge into the sea, therefore, would not greatly affect them. It is conceivable that during heavy floods in the past, as even now may be the case, some of these fish would be carried beyond the influence of the estuary.

Presuming this to have been the case, the castaways, finding themselves in the midst of plenty, would have no occasion to return at once to the tide-way. In the meantime they would become acclimatized to the changed conditions, the result being gradual differentiation of form and character, ultimating in—

- (1) the species we recognize as Sea or White-Trout ; and
- (2) the Salmon.

Proof of the near relationship between salmon and trout is the fact that ova taken from a 20 lb. salmon can be fertilized by milt from a trout of a few ounces, a cross which naturally

produces a hybrid. Owing to the facility of cross-fertilization (accidental) between these species (trout, white-trout and salmon), the production of salmonoid hybrids is of frequent occurrence and the cause of much confusion to anglers and others, who are often puzzled to identify these fish. A consequence of this is that many local names have come into use which are extremely misleading, especially to the uninitiated who might naturally suppose there exist a variety of thalassadromous salmon, whereas, probably, there are only two fixed species, all variants being hybrids of one and another of these three species (including trout).

Salmon, whose ancestors, we believe, were trout, having thus outgrown the river to such an extent that it was no longer possible to obtain food in it, systematically journeyed to the sea to cater for themselves, returning to fresh water for breeding purposes only. This they continue to do, because, being river fish, fresh water is essential to the hatching and maintenance of the young for the first year, when their appearance is so similar to that of trout of the same age as sometimes to puzzle the angler himself to distinguish them apart. When, after sojourn in the sea, the fish returns to the river, the digestive organs lapse into a

state of abeyance, food no longer assimilates;¹ in lieu, the salmon subsists on its own fat and high condition consequent on a rich sea diet. For this economical arrangement, which provides against what otherwise would be a time of starvation, subconscious foresight is answerable.²

Not so long ago, anyone who ventured to assert that salmon take no food when in fresh water was immediately posed with the question : " Why, if such is the case, should the fish be attracted by the various baits and lures presented to them by the angler ? " But of this we shall see later.

¹ This does not apply so strictly to white trout ; possibly on account of their smaller size their food requirements come within the limits of the river's supply.

² No ordinary salmon-river produces a tenth part of the food necessary to meet the sudden invasion of a number of huge predatory fish, supposing them to be dependent on it.

CHAPTER XX

THE SALMON-FLY

THE fact of salmon rising to the so-called "fly"—a monstrous artificial production in many forms and colours, resembling nothing on earth or in the water—presents somewhat of a puzzle to those anglers who are convinced that, whatever be the attraction, it is not a sense of hunger which prompts these fish to pursue the lure.

It might appear that this matter is not germane to the subject, yet I believe a solution to the problem will be found whilst pursuing the very same lines of thought. Let us see.

Like all unreasoning creatures, the fish is controlled by the subconscious principle within it. The subconscious mind, as before noted, responds promptly to external circumstances, and, so far as may be, always in favour of the welfare of the creature. Now the subconscious mind functions naturally, without reference to any mental process, and in the purely natural world this is all-sufficient and works without

hindrance, perfectly. But when man appears on the scene he forthwith upsets nature's arrangements, because his knowledge (acquired), though general, lacks the perfection of instinct. The animal, on the other hand, having no independent reasoning powers, is at one and in sympathy with nature. When considering nature this fact *must* be borne in mind, namely, that animals have no sense of reasoning.

Had salmon the power of reflection, however limited, the angler would meet with even less success than at present attends his efforts.

Unwittingly, for the most part, the angler takes advantage of this fact, namely, the salmon's incapacity for reflection. But of this we shall see later. In the meanwhile, we will again consider the behaviour of animals in general under certain incidental circumstances which perhaps may throw a light on the subject.

All creatures, as we have seen, are provided with one or more means for self-protection, without which they could not compete in the struggle for existence.

The weaker ones, those who possess no actual weapons of defence, rely on wing power and swiftness of foot. These are mostly of a shy and timid order, and when suddenly

surprised either escape at once or promptly conceal themselves, or seek shelter after out-distancing the enemy. If, however, the intruder has first been detected at a distance, these creatures assume the rigid, observant attitude as noted under wildfowl. But, in this case, should the enemy, for some reason, chance to make a retrograde movement, it often happens that these naturally timid ones cautiously proceed to follow in the wake of the foe; an innate sense of curiosity seems to lead them on in the track of possible danger. The more unusual to the surroundings or abnormal in appearance is the object, the greater the attraction appears to be.

An instance of this may be seen at a duck-decoy, where a dog is used to *attract* the birds. Though the dog is a natural foe perfectly well known to the ducks, he is, in this otherwise quiet spot, *out of place*; but when in the middle of the pool the ducks (subconsciously) know they are safe, and as the dog retreats along the edge of the water (he is trained to do so), the birds start to swim in his direction until they have passed within the first or outer screen of the decoy; then the dog slips back under cover and shows himself *above* the screen and *behind* the ducks. Now the distance between the dog and the ducks is much

reduced, the latter become alarmed, and in their fright press on up the narrowing water. In the meanwhile, the dog (or decoy-man) keeps moving on from screen to screen, until finally the whole flock is enmeshed.

Now, had the ducks a spark of individual intelligence there is nothing to prevent them from either swimming or flying back into the open water with impunity, but they cannot do so for lack of reasoning powers.

A sense of what we must understand as curiosity is quickly aroused in birds by the sudden appearance in their midst of a foreign species of gaudy plumage; even a yellow canary, at large, will produce the same effect, which is, as most people know, that the unfortunate and, maybe, harmless creature is at once mobbed and set upon by all the small birds in the neighbourhood. The meaning of this is that the bird is strange, *i.e.*, not natural to these particular surroundings; the subconscious mind, therefore, is not in sympathy with it; but should the occurrence become common, natural harmony, by degrees, is restored. The readjustment is gradual, because there is no intelligence whereby it might be quickly effected.

In the same way animals become accustomed, as we say, to innovations, such as

bicycles, motors, aeroplanes, etc. What at first caused terror no longer affects them when ceasing to be anything out of the ordinary.

A horse, for instance, is easily affrighted, and so may be classed under "timid animals." Quite an insignificant object, if out of place, causes a horse to shy and bolt. Trusting his legs to carry him swiftly out of the (supposed) danger zone, the animal makes off at full speed. Many grave accidents have resulted from this proneness on the part of the horse to shy at misplaced objects.

The elephant does not shy; not perhaps because the beast is more courageous than the horse, but because it has other means for self-protection in the stead of speed on which it can barely rely.

When speaking of the horse we sometimes apply the term "courageous," "an animal of high courage" is a common expression; but, naturally, the creature is highly strung and nervous, and shows courage *only* when inspired by a *human* spirit. (Horse and rider should be in *telepathic* sympathy.) Though many are savage, no animal, I believe, is really courageous in the true sense; real courage infers a realization of mortal danger which animals cannot appreciate.

As an example of animals becoming

accustomed to non-natural objects, we might instance some manufactured article, such as an umbrella. A horse who had never seen a man carrying an umbrella over his head, and was suddenly to meet one, would almost certainly shy, if he did not actually jump round and bolt in an opposite direction ; but after seeing the same constantly, he becomes gradually reconciled and finally ceases to take any notice of it whatever.

Now, change the scene. Picture the same horse being led through a gate and turned loose in the field. His first impulse is to start off at full gallop, head and tail in the air.

Full of spirit on obtaining his liberty, the horse careers wildly round the field feeling, no doubt, in complete sympathy with his surroundings, which, in fact, for the moment he is. Thus galloping, the animal rounds an angle of the hedge when he comes suddenly on an open umbrella lying prone on the grass and rocking in the wind.

Under these conditions, no longer normal, it would be fairly safe to say that the animal would inevitably shy at the object (which he has seen a thousand times before, but under different circumstances) and gallop from it as one possessed. But after covering a certain distance the horse is seen to face round, stare

at the umbrella and snort. Then perhaps a sudden gust drives the umbrella towards him, whereupon the animal starts off again in mad career. But being confined by the hedges of the field, he eventually finds himself on the further side of the dreaded object, which, meanwhile, continues its erratic course before the wind. But now it is travelling *away* from the horse who, by this time, has come to a standstill and is gazing fixedly at the retreating object. By degrees the panic condition subsides, giving place to curiosity, and the horse, like the ducks, slowly proceeds to follow up the very object which at first was the cause of such abject fright.

The end of it is, the horse approaches the umbrella and actually sniffs at it ; but he comes to no reasonable conclusion, the proof of which is that should the umbrella chance to be blown out in his face, he becomes panic-stricken as before. Yet the thing is perfectly harmless, as any being with intelligence would have seen at a glance.

We gather from this description, which I think is fairly true to nature, that the senses of fear and curiosity are somehow connected.

The animal man (and dare I say woman ?) has this same sense of curiosity strongly inherent, as is shown by the following common

expression : " My natural sense of curiosity compelled me to go and see what it was."

Exactly ; his *innate* sense of curiosity overwhelmed all considerations at the moment the occurrence took place.

The subconscious mind is in action before the intellect can be brought into line. The animal having no intelligence is simply led on indefinitely by its sense of curiosity, even though it be to destruction ; but notwithstanding, this sense of curiosity would appear to be one of nature's schemes for self-protection. So long as their surroundings are entirely normal the creatures live and function in complete harmony with nature, for they themselves are parts of the natural surroundings ; but when anything abnormal occurs a discordant note is struck which destroys the harmony ; it no longer rings true. The consequence is the animals become restless, and are impelled to go and inspect the cause of the disturbance though they are powerless to reason out the circumstance, and cannot tell whether the appearance portends danger or not. The result is that the creatures are either scared into the panic condition, or else held to the spot, fascinated.

In most cases an unnatural happening *would* be fraught with danger, especially to animals.

CHAPTER XXI

CREATURES ATTRACTED BY UNUSUAL APPEARANCES

Now to examine some further examples of the way in which creatures are attracted by unnatural, unusual appearances.

Let us imagine a herd of cattle peacefully grazing in a meadow whilst the farmer is seen making his way across the field. Unless the man is bringing food, or it happens to be milking time, he attracts no attention, the beasts do not so much as look at him. But should he elect to stop in the middle of the field and then proceed to stand on his head, maintaining that posture, the whole herd will be round him in less than no time, and, moreover, he runs considerable chance of being butted by one or more of the animals, who are supposed to know him well. In the meantime, the man in the road laughs at the spectacle, and inwardly exclaims, "What a fool old Jones is making of himself"; but he feels no pressing inclination to join in with the assembled beasts, for the whole scene has been enacted deliberately. To him, Jones is still

Jones, whether standing on his head or his heels. But this is not so with the beasts who can only perceive an abnormal appearance, which first startles, then attracts, and finally *irritates* them.

It is true the spectator may experience some curiosity as to why Jones should have made such an exhibition of himself, and this causes him to reflect ; but what primarily induced the sensation of curiosity was the working of his own subconscious mind.

Taking advantage of this sense of curiosity in unreasoning creatures, man has invented an ingenious device for attracting larks. These birds (skylarks) have a marketable value, and judging from the numbers seen hanging up in the poulterers' shops it is evident that in some way they are slaughtered wholesale. Netting, probably, accounts for many, though of this I have no experience, but can testify to the efficacy of the above-mentioned invention, which, without going into unnecessary particulars, consists of a column of upright prismatic mirrors arranged in circular form and rotated by clockwork.

This apparatus is placed on the ground in open country, and, of course, can only be used in clear weather, when the rays of the sun are refracted by the mirrors, with the result that

the scintillations therefrom are visible at a long distance. This entirely abnormal appearance proves irresistible to the larks, who soon gather round and wheel about in great numbers above the object of their curiosity.

It is then an easy matter for the sportsman (?), concealed under cover of a stunted bush or "hide" of some kind, to fire into the "brown," and to keep on firing at intervals, for the larks seem positively hypnotized and are loath to quit the spot.

Light intensified by darkness has always a great fascination for animals. The beasts of the forests, though fearing fire, nevertheless are attracted by the light of camp fires.

"The moth to the flame" is proverbial. Insects of all kinds come to light, and by this means many rare specimens find their way into the entomologist's cabinet. And lastly, fish, particularly salmon, fall a prey to man from a sense of curiosity which impels them to rise to the surface of the water when a bright light is shed from above.

If it were not for this subconscious impulse, so commonly observed in nature, namely, an irresistible desire to pry into something unknown, I believe it would not be possible to take salmon in fresh water with any kind of bait or lure.

That we can do so, occasionally, is due to a psychological condition which, to my mind, makes the salmon problem extremely interesting both from the scientific and practical point of view.

In deluding trout by means of an artificial fly there is no mystery whatever. In this case the fish seizes the object for what it represents, namely, an exact copy of the insect food of which the trout is in search, and which it greedily takes when skilfully presented. But in salmon fishing, skill is not nearly so essential ; that is to say, the veriest tyro, who by no possibility could catch a trout, may easily hook a salmon, providing he can manage to get the fly somehow, or anyhow, over the spot at the " psychological moment." That is the whole secret, and unless the angler is fortunate in timing this event he may fish, never so skilfully, the whole day long without moving a fish, and then perhaps, to his disgust, behold the said tyro arrive on the scene and immediately get fast in a salmon.

Success in salmon fishing, as I think any old hand will agree, is absolutely a matter of luck in so far as raising the fish is concerned. The most that can be said is that the man who " sticks at it " longest scores the most fish.

CHAPTER XXII

THE " GENTLE ART "

THOUGH this is not intended as a treatise on angling, it is necessary to go into some details in connection with the " gentle art " in order to review the matter from a psychological standpoint, and incidentally to suggest a reason why the fish is so erratic in its movements.

Anglers of experience, having formed their own opinions on this subject, are not easily converted to another's views and theories ; there is no reason why they should be ; therefore in submitting my conclusions, based on a long experience, I write in no dogmatic spirit, but offer them for what they are worth. At the same time, I shall endeavour to make no statements unsupported by evidence familiar to anglers.

Now, with regard to salmon flies, there are certain recognized standard types, besides innumerable fancy patterns, not one of which has a living prototype ; however, all are

duly, if absurdly, named. Thus we have "Doctors," "Butchers," "Rangers," "Snow flies," etc.

Who, indeed, ever heard of a Snow fly ! Surely not the salmon, nor did he ever see the ghost of one until some cunning angler first presented to his notice a bunch of bright coloured feathers tied to the silver-gleaming shank of a hook.

The generality of salmon anglers are greatly exercised in their minds regarding the "right" fly to use before proceeding to business, and much precious time is often wasted whilst selecting it. The state of the water, weather conditions, the size of the fly and, last but not least, the *local* type of fly must be considered. For instance, a Dee fly is regarded as perfectly useless in the case of salmon inhabiting the Blackwater (County Cork), and vice versa ; a "Lemon-ended-grey" would be deemed entirely out of its element on the Dee. In fact, each river appears to have evolved a special "breed" of fly, adapted to the locality, but useless elsewhere. Seeing that not one of these "fancies" represents anything on earth, the matter might be described as "one of those things no fellah can understand." And the most amazing part of it is that there should be exceptions. However, exceptions there are ;

some few patterns are permitted and may be hopefully cast upon *any* waters.

Prominent amongst these is the well-known "Jock Scott," an excellent all-round fly which, as a matter of fact, will kill fish the world over ; and from this very fact, it may be, we shall obtain a clue to at least part of the mystery.

Possibly it may never have occurred to anyone that the dominant colours embodied in the "Jock Scott" are "warning colours"; not only that, but warning colours of the deadliest type. Yellow, or orange and black, is nature's indication that the bearer is not only distasteful, but actually poisonous. All creatures recognize these colours, and promptly reject *as food* anything remotely approaching this combination. "Warning colours" are *intentionally* conspicuous in order to attract attention and so give timely notice of the quality of the bearer. I fear, however, that this argument is by no means calculated to inspire hope in the breast of the angler who, under the belief that he is offering a dainty morsel for the salmon's palate, presents a "Jock Scott" to his notice. No, *as food*, it would certainly be declined ; but, it has the effect of *attracting* the fish, which is the first step.

Now we shall look at the matter from the salmon's point of view, always supposing him

alive to passing events. Thus, the famous "Jock Scott," arrayed in "orange and black," comes overhead. At first the fish regards it with suspicion as being something unnatural to the surroundings, but any sense of fear is soon dispelled by the fact that this strange apparition shows no signs of aggressiveness; on the contrary, it has all the appearance of trying to escape. This at once acts as an incentive, and his natural curiosity being aroused, the salmon goes in pursuit. The slow moving object is quickly overhauled and completely at the mercy of the pursuer; but warned by its colours, the latter turns over and comes back to his original station. Again the "jigging" object appears overhead; the salmon's curiosity is once more aroused; plunging after the retreating form he rolls over it with intent to destroy. But at the third offer the fish is fairly *irritated* and charges ferociously, snapping at the object as a dog might snap at a wasp, though, subconsciously, he knows it for a noxious insect.

It may be objected that this presentation of the case is problematical. But is it? We will interrogate the angler on the bank as to what has happened. Says he: "The salmon rose at me three times, *twice* he missed the fly, but I had him the third time."

If the salmon *missed* the fly, he did so intentionally. What is the proportion, I wonder, of rises to one salmon that is hooked?

A salmon rising with real intent to capture the slowly moving object would not, I believe, miss it once in 100 times, whereas, in actual practice, the "misses" far outnumber the "hits."

We observe that the fish has several modes of approach and attack. Sometimes he rises, apparently, at the first offer in a determined manner, which is considered the best kind of rise. At another time he makes several feints before finally catching hold (as described). Then again, he is distinctly seen to follow the lure slowly right across the river, repeating the performance at each succeeding "cast." In this case the fish rarely takes hold. Sometimes the salmon will come with a rush, head and shoulders out of water, throwing himself on top of the fly, apparently with intent to drown it. The angler "strikes," but, as a rule, the fly comes back without resistance, though there is always the off chance of foul-hooking the fish, which, as a matter of fact, does occur not infrequently.

To my mind these various performances suggest that the salmon is not out for food, but is attracted by *curiosity* which culminates

“JOCK SCOTT” AN ALL-ROUND FLY 161
in irritation or anger, as we might describe the same emotion when manifested by the cattle butting at the inverted man.

The subconscious mind of these creatures *resents* what it cannot understand—what, in fact, is inharmonious or out of keeping with the surroundings. Fear succeeded by curiosity and anger, it would seem, are different phases of the same subconscious emotion. After awhile, when the “Jock Scott” or other “fancy” is daily fished down over the same water, it becomes *part* of the surroundings, and the fish, greatly to the disgust of the angler, ceases to take any notice of it whatever, which would not be the case if the salmon was hungering after food.

That the “Jock Scott” has the reputation of being one, if not the best, all-round fly is in itself significant; there must be some reason for it: the fly could not have become a universal favourite did it not possess some exceptional qualities. I have pointed out what, in my opinion, may be the explanation; but, in any case, the angler, when in doubt, can hardly do better than mount the “orange and black.”

Should a brother angler chance to read these, my views, on this particular fly, and be impressed by them, he may think to himself

“ now I have a ‘ tip ’ for the ‘ right ’ fly,” and truly I believe that, given other things equal, he would kill, not more perhaps, but as many fish, using this one fly (in different sizes) only, as another free to choose from the whole category of so-called salmon flies.

In trout fishing the angler can pretty well judge when the fish may be expected to rise ; in fact, he can see them in the act of sucking in the natural insects as they float down the stream and fish accordingly. But when salmon show on the surface it is no indication that they will rise to our fly ; indeed, it is rather a bad sign than otherwise. A salmon may come at any time, or he may not come at all, though we know, for a fact, that he lies in a certain spot, and as if to reassure us of his presence, occasionally shows himself by jumping out of the water. Perhaps after toiling daily for a week we at last succeed in getting a rise out of him.

Now, in my belief, this erratic behaviour can be accounted for when we come to look into the creature’s habits. Why does the salmon ascend rivers ? And what is he doing there, from the time of arrival till the breeding season commences, a period covering some months ?

As we have already noted, salmon enter

fresh water for no other purpose than to shed their spawn, and during the interval of waiting they are doing, practically, nothing—merely waiting for the ova (and sperm) to mature. But to this end oxygen is highly necessary, therefore we observe the fish lying mostly in the heavy, aerated streams ; but as the water gets low and becomes stale and tepid, the fish, now and again, is compelled to come to the surface and obtain air from the outside. I make this statement with some assurance, as I have been in a position to see a *chain* of air bubbles rising from the depths which could not be confused with scattered bubbles resulting from the splash of the fish as he plunged.

In highly aerated waters, such as the snow-fed streams of Norway, salmon show less on the surface, though probably there are more fish contained in these rivers.

When creatures, either from lack of food, climatic conditions or for other reasons, are forced to “weather” a certain period, they become inactive and pass into the state known as “hybernation” or “æstivation,” as the case may be, when they rest in a torpid or semi-torpid condition until nature is again ready for them to resume active life. This, in my belief, is the salmon’s case. Shortly after entering fresh water the fish lapses into this

condition, namely (in his case), æstivation ; but, from various causes, the salmon's sleep is constantly interrupted. Temporary wakefulness is common to other creatures when in the same state.

It may be said that if salmon were in a torpid state they would be unable to hold their own in the strong currents they are known to frequent ; but even this (though immaterial to my argument) I believe possible ; for when we consider the shape and weight of the fish, it is obvious that the slightest motion of the tail is sufficient to keep it stationary in the heaviest streams. The waving motion of the tail of a fish in running water is automatic and never ceases. An instance in point was brought to my notice on an occasion when a pike had been landed. The fish was knocked on the head and suspended from the branch of a tree. When in this position I noticed the tail rhythmically waving ; this it continued to do for half an hour with exactly the same motion as if the fish were alive and still in the water.

However, as a general rule, salmon lie behind submerged stones and rocks, and for this reason the most likely " runs " to hold fish are those in which rocks and boulders are strewn about on the bed of the river, and so

deflect the swift-running current. Though not always apparent from above, a swirl on the surface of the water denotes the whereabouts of these obstructions, and the experienced angler searches carefully with his fly round about these spots, for, if anywhere, it is here the salmon will be found ; though whether he be in a condition to notice the fly is another matter. When in the lethargic state I have suggested, the fish will not see the fly, and the angler's best endeavours prove fruitless.

CHAPTER XXIII

A PERSONAL EXPERIENCE

THE following, a personal experience, went far to convince me that salmon in fresh water pass much of their time in a drowsy, slumberous state.

A friend and myself were trout fishing, in early summer, on an Irish river. The water at the time was dead low, and a bright sun overhead. It was afternoon, and as there was no prospect of sport I was sitting idly on the bank watching my companion, who, with a view to fishing the current in mid-river, was in the act of wading out through a shallow back-water, the bottom of which was strewn with stones and boulders ; in high water a likely enough spot to hold a salmon, but now too low for anything. Presently my friend called to me to the effect that a salmon lay between two boulders just in front of him. In answer, I begged him to remain quietly until I should come out, thinking at the same time he must be mistaken on account of the shallowness of the water.

However, after coming up behind him, there, sure enough, was a salmon of about 12 lb., lying in less than 3 ft. of water and fully exposed. Intent on making a nearer inspection, I cautiously advanced until getting within a few feet of the fish's tail, where I could see the eyes and every scale on its body. I then carefully backed out without disturbing the fish, and, together, we returned to the bank to consider the situation. We had nothing in the shape of salmon tackle, nor would it have been of any use, in a legitimate way, even had we possessed it. After consulting for more than half an hour, we came to the conclusion there was nothing to be done by fair means ; but the day, so far, had been blank, and here was a fish literally within our grasp. We determined, therefore, if possible, to "grasp" it. So, divesting myself of coat and tucking up my sleeves, I again waded out to the spot and found the salmon in the very same position. But this time I got still closer, practically standing over him, so that I could now clearly observe the gills functioning in a perfectly regular and normal way, which fact convinced me there was nothing wrong with the fish, though why he permitted so close an approach was more or less of a mystery.

Now or never, thought I, so bending over

the water (my head now on a level with that of the fish) I slowly lowered my arm, intending to grip the salmon above the tail rays. But the end came quickly. For at the moment of contact, before I could close down on him, the form simply vanished as if it had been some phantom of the depths. So quick was his passage, I can only describe it as the flight of an arrow from a bow ; nothing remained but a little cloud of dissipated sand.

Had my attempt succeeded, in all probability the story would not have been told. However, even had I obtained a fair grasp, I much doubt whether it would have been possible to hold on to a fresh and vigorous fish. Like most anglers, I had landed many a salmon on the line by this method, therefore knew exactly how to proceed ; but, alas, this awakened fish was too much for me.

Though it ended in a tramp home with empty creels, the day had not been profitless ; for though I had failed in seizing a salmon, I had, so I thought (and still think), "snatched" a secret from nature.

That this salmon was perfectly healthy but in a natural lethargic state, I was fully persuaded ; there was no other possible explanation. A salmon with his eyes open, so to speak, would not have permitted an approach

such as we made on the two occasions ; more, he would not even have remained where he was in the face of the first intruder who chanced to pass along the bank. I have no doubt in my own mind that what happened was this : the salmon had taken up his " lodge " during high water, lapsed into the torpid condition, and, being undisturbed, remained thus until we discovered him, by which time the water had subsided and run down to a low level. In the reaches where the incident occurred, the river was wont to run off after a short spell of dry weather.

It has since often occurred to me, when thinking of this event, that it is utterly futile to cast over a fish in this state (state of *æstivation*). A sleeping salmon—or, at all events, a salmon unconscious, for some reason, of the presence of a man bending over it—would scarcely be in a condition to notice a small object such as a fly ; and as with this particular fish, so probably was the case of all the others of the same species at that time and state of the water.

Although the salmon *æstivates* during the summer months, his sleep, as we may call it, is perpetually interrupted by the sudden changes that take place in his native element. An alteration in temperature, or rising of the

water (spate), will awaken the fish, and as the flood comes down he is impelled to continue his upward journey to higher reaches. The salmon being now fully awake pushes up stream until the water begins to subside. This is the angler's most favourable opportunity, because, not only is the fish awake, but on the move, seeking a fresh "lodge" in which he will again become dormant so soon as the river declines. In the meanwhile, the water is still discoloured, which is also in favour of the angler. Under these circumstances, and provided the fish are up, the chances of attracting and hooking a salmon are considerable; but once the water drops to summer level the pursuit becomes well nigh hopeless. As autumn draws on, however, matters begin to improve, though the fish himself has very much "disimproved"; for now he presents a dull coppery-red appearance instead of the bright silver-sides we observed in the spring. But he takes the fly much more readily, simply because, having passed the period of æstivation, the creature is wide awake and on the move in anticipation of the breeding season.

The angler's next meeting with the salmon is early in the following spring, when the fish, lean and lanky, has resumed his silvery coat of scales, and is then known as a "kelt" or spent fish.

His habits are the same as before, excepting that he is now no longer in the torpid state, and shows himself more frequently on the surface, for in his present emaciated condition oxygen is more than ever necessary to keep life in his body pending the flood water which eventually carries him down and out of the river. Thus, from first to last, the salmon takes no food in fresh water ; but, in the "kelt" stage, the fish is more easily attracted by a lure than at any other time, chiefly because he is awake, and also, perhaps, because the fasting period having nearly come to an end, the naturally predacious fish is induced to grab at anything that comes within reach ; but, most assuredly, the kelt does not wander in search of food.

It may be asked, "What of real baits used by the salmon angler ? " My answer is that what I have said of the salmon-fly applies equally to these. All of them, without exception, are unnatural presentations. The worm, of course, is a natural bait as far as it goes, but it goes three at a time ! Three lob-worms strung together on a single hook are fished in low, clear water, when no worms or other food matter comes down in a natural way. In high, discoloured water, when trout can be freely taken with worm, salmon will not look at it ;

knowing it to be useless, the angler does not then adopt this method. But in clear water, salmon are now and again attracted from sheer curiosity : the fish nibbles gently at the trailing worm-tail, but oftener than not, drops it and has to be drawn out a second and a third time before actually taking the worms into his mouth. Still, the fact remains, that the fish, given ample time, will sometimes swallow down the whole bunch, though whether the worms so taken (eliminating the hook) would remain in the stomach is doubtful. Fish, it may be said, have great facility for disgorging ; at any rate, no alimentary matter is ever found in the intestines of salmon (including kelts) which have been in the river for any length of time ; therefore, it seems reasonable to conclude that the salmon does not swallow this bunch of worms because he *needs* food.

Another bait is the " prawn," a useful lure at times, but of all unnatural curiosities employed by the salmon angler this is, perhaps, the most preposterous. To begin with, a prawn in any case is not natural to fresh water, and when boiled assumes an unnatural colour ; added to which, the movement imparted to it by the angler (it is dragged tail foremost against the current) is false to nature. But under certain water conditions the prawn excites the

salmon's curiosity; he follows it; but observe (it is sometimes possible to do so) how he follows it. In most cases the fish does not come with a rush, but slowly pursues the object as if intent on making a thorough inspection before venturing to touch it. Then perhaps the angler is conscious of a momentary "pull" or drag on the line. I particularly mention this fact because it is inconceivable how the salmon can touch the prawn *without* being hooked, seeing that a flight of hooks lie at the extreme end—that is, at the head of the prawn facing the fish. Such, however, is what constantly happens in actual practice, and a "strike" at this juncture is likely to prove fatal, as regards the angler.

I can only think that the fish makes a tentative offer for the bait, at the same time closing down his jaws on the *feelers* of the prawn, which, of course, protrude some distance beyond the hooks.

Spinning baits, whether real or artificial, may be briefly disposed of as being merely variations of the same system, which is to attract attention by exciting the fish's natural curiosity. The eccentric movement of these baits gives the appearance of a fugitive disabled and endeavouring to escape. And here we may note a natural law which rules that

nothing shall survive that is not absolutely fit—is not in complete correspondence with its surroundings. Thus, in pure nature we observe that when a creature is in any way sick or disabled, its fellows, instead of tending it as would be the case with humans, mob and drive it away, if they do not actually destroy it. The fact, therefore, of a creature being in trouble is in itself sufficient to incite another with full powers, especially one of predatory habit, to go in pursuit.

Before leaving this subject I would say, that if evidence of a strong nature were necessary to prove that salmon do not feed in fresh water, it lies in the fact that no salmon (so far as I am aware) has ever been known to take a live bait, a really natural object, and which proves so deadly in the case of other predatory fish—pike, perch, etc. No angler in his senses would dream of live-baiting for salmon.

I have dwelt at some length on the salmon problem in order to show the psychological aspect of the case ; but to do so, and obtain the strongest evidence, it has been necessary to go practically into angling matters. Such evidence bearing on the behaviour of salmon under certain conditions as I have here submitted, is only within the knowledge of practical anglers, but I have little hesitation in

saying that these, whatever be their individual impressions as to the actual cause which induces salmon to rise and take the fly and other baits, will bear me out in these particulars.

Fish, when in company (schools), manifest very clearly the telepathic mind-blending phenomenon. This will be apparent when observing the movements of a packed mass of recently hatched fry, such as minnows, or sea-fry of any kind. As in the case of the birds, the action of each tiny atom synchronizes with the movements of his fellows, which causes the massed units to move as one body. This appearance is best seen when the fish are swimming in mid-water, clear and still.

CHAPTER XXIV

THE SWARMING OF BEES

IN respect to mind-blending, I have so far maintained that all the units of a group, irrespective of sex and age, are of an equality ; but as all rules have exceptions, it is well to look into nature for one which may prove the rule in this instance. Possibly it may be discovered in Hymenoptera ; therefore, let us take another glance at these insects.

The "swarming" of bees is not only an extraordinary sight, but is significant when taken in conjunction with my proposition.

What is this wonderful attraction which enthral the worker - bees? "The queen, naturally." Yes, in every sense the "swarming" process is a natural scheme which ensures the continuity of this particular species. Overcrowding necessitates distribution, and as in the case of the processionary caterpillars, it is imperative that the bees keep together when seeking to form a fresh colony, a special means has been evolved to meet the

conditions ; hence the passing from place to place of a large number of insects, flying in company, is effected with absolute certainty. The queen has a strong attractive power, distinct from sexual attraction, seeing that those subject to her spell are " neuters " (undeveloped females). It also seems fairly certain that the swarming bees are not influenced by sight, for, ignoring the fact that insects have a short range of vision, the bulk of them cannot obtain a glimpse of the queen, so completely is she blotted out by an inner wall of the insects themselves.

Now the units composing this seething mass are exactly of the same size and pattern ; the queen, on the contrary, is much larger and different in form, so that she is easily distinguished by the human eye with a reasoning sense of proportion. The inference to be drawn from this unusual divergence—according to my argument—is, that though not one of the community, of whatever description, possesses an atom of intelligence, *all* are imbued with subconscious mentality ; but in the queen there is centred a nucleus—a larger share than possessed by any other single unit. This may very well be, when we come to consider the vitality (the Force-of-Life) in this abnormal creature, the Queen-Mother, who has it in

178 THE QUEEN-MIND, A CENTRAL FORCE
her to vitalize an entire colony. Thus
whereas the mind-units of the workers are
equal, the queen-mind preponderates and acts
as a central force.

But this case, exceptional as it is, does not
affect my original hypothesis, namely, that
the group or "swarm," as the case may be, is
served by one *pervading* mind.

Myers says: "Mutual gravitation or kin-
ship of spirits which is the foundation of the
telepathic law."

This concisely describes my understanding
of mind-blending as I have applied it to the
Animal World.

It is not necessary for my purpose to dwell
on the doings of bees whose proceedings have
been so ably treated by more competent
writers. But in case it should be urged that,
though my theory may possibly account for
the act of "swarming," it does not apply to
the behaviour of these wonderful creatures
when at work in the hive where *dissimilar*
operations are in process at the same time, I
therefore propose the following simile, which,
notwithstanding that it deals with human
units, appears, to some extent, to fit the case.

Thus, we will compare an insect community
to a vessel at sea with a full complement of
men. During the voyage from one port to

another the ship is completely isolated, and therefore self-dependent. In fine weather and foul weather the vessel continues to maintain a true course, and ultimately reaches the haven of her destination.

This achievement is the result of the combined labour of many hands in various capacities. But these hands (members of the crew), who bring the ship safely into harbour, have no will of their own in this matter. They are neither supposed nor required to think; simply and automatically they obey orders transmitted by the Captain, who has in his mind—or should have—the whole working system of the ship in minutest detail. Any inclination to reflect on the part of these human units tends only to obstruct the proper conduct and management of the vessel.

In regard to the actual undertaking, all hands are imbued with the same object, viz., to bring the ship to the port of her destination. But it is immaterial that these hands shall know the name of the port, or even the intention of the undertaking. But as to the work in hand all the members of the crew, in whatever capacity, are of the *same* mind, *i.e.*, *one* mind which is open and free to receive thoughts (verbally transmitted in this case) emanating from the Master-Mind, the Captain of the ship.

This is an example of inclusive, sympathetic reaction, without which no undertaking that necessitates combined labour can be accomplished.

If this is so in the instance of a human community, how much more perfect must be the system where the "seat of mentality" is infallible and the individual units *devoid* of reasoning powers.

From this it will be seen that the human members and the insect units of a community behave in a very similar manner. In either case their actions are, so to speak, automatic. But there is always this difference between the human and the insect unit, namely, whereas the former must first learn and then practise his one job until it becomes subconsciously impressed, the latter, being incapable of intelligent effort, acts, from the first, in accordance with spontaneous knowledge—knowledge which, in the case of bees, includes the execution of many duties simultaneously performed. But in both instances one mind pervades the whole company.

Another example, in which the reasoning faculty is eliminated, is presented when we come to consider the functional operations, simultaneously performed, which are in constant process within the human body. In

health we do not consider nor give a thought to these functions, for they operate of themselves, automatically, as we say ; but really they act under the control of the natural, subconscious mind which, truly it may be said, is the ever-wakeful "captain of the ship."

Bees are endowed with a greater variety of instincts than perhaps any other community of insects. The doings of these creatures are so astonishing that it is difficult to believe that their works are not the result of reason. The effects of instinct seem more wonderful than those of reason ; and so indeed they are, and much more certain in their performance than can ever be the tentative efforts of the reasoning mind.

No sooner has a bee dried her wings after emergence from the native cell, than immediately she sets to work with a perfect knowledge of what has to be done, and does it accordingly. It is absurd, therefore, to imagine that the creature is acting with individual intelligence. And yet it seems to be a generally accepted fact that bees, prior to swarming, send out *scouts* to prospect for a suitable habitation which, it is said, is subsequently occupied by the new colony. Who sends them ?

If this act of scouting were indeed a fact, it

would prove beyond all question of doubt that bees are reasoning creatures possessed of minds on a level with human intelligence. For, in this event, the bees must certainly communicate the results of their investigations, and at the time of swarming the said scouts would have to *lead* the way to the previously chosen spot, always supposing that the bees' sight is such as to enable them to keep the leaders in view. Without individual intelligence, such a performance must be impossible.

As, naturally, we are apt to regard animal manifestations from the human standpoint, it is little wonder that we can be deceived by appearances. This "scouting party," for instance, may have quite a different interpretation put upon it. The scouts, we will say, are observed busy on the roof of a house. At first they are seen to rove up and down the sloping slates or tiles, evidently in search of an aperture which may or may not exist; but in any case they have some trouble in finding it, which is due to the bee's very short range of vision. It is not, however, the hole in the roof which first attracts the bees' attention, but the fact that under the roof there is a *hollow* space. How do they know it?

As the water-finder discovers the presence of an underground spring, and the ichneumon-

fly detects the larva concealed in the wood of the tree, so have bees a like power of finding cavities which from the outside show no indications.

That this is actually the case I have no doubt whatever, and I think that anyone investigating in the way I have done will come to the same conclusion.

But first I should say that, in my belief, these "scouts," though possibly belonging to the same hive, are not sent out in connection with the swarm, but are merely insects whose line of flight to the meadows has chanced to carry them over the house-top, where their course has been arrested by a certain sense perception which to these insects indicates a cavity.

But if after due investigation no means of ingress be discovered the bees abandon the house, though some few find their way through the windows; the bee, however, has no use for an aperture of the dimensions of a window frame. On the other hand, should a hole be found in the tiles, that particular roof will always attract a certain amount of bees, for these creatures cannot resist exploring a hole which leads to a cavity.

Seeing that bees are bred and reared in cavities of some description, where, indeed,

the most part of their existence is spent, it is a very natural instinct which inclines them to make these explorations.

Now we shall proceed to a practical test which, in my opinion, suffices to prove that bees have the power to discover cavities independently of eyesight.

Let the nature-student betake himself to a wood where the trees are sparse. Here on a bright day in early spring he will meet with humble-bees of different species who are making their first appearance after hybernation. These bees are all females bent on the same object, which is to find a suitable underground cavity wherein to rear the brood of the year.

Whilst strolling in the copse the investigator soon catches sight of his quest, a portly humble-bee, who is in the act of flying round in circles over the ground ; as he approaches the insect buzzes round him and then goes off, but returns again immediately to continue the same manœuvres. In the meanwhile, the observer has taken up his position against a tree, where he remains motionless and watches the bee in the execution of her circuitous evolutions.

But to state the matter shortly, the meaning of this particular behaviour on the part of the

bee—which can only be witnessed at this season—is that she is now in the act of "sensing" the ground for a cavity in which to construct her nest. In nine cases out of ten she is unsuccessful—no such cavity exists ; in that case the bee goes off elsewhere to resume her quest. Thus the naturalist needs to have patience. But his time will come ; sooner or later he will be rewarded by seeing the bee, after circling round in the usual fashion, drop on the ground and commence to crawl about amongst the dead leaves and brambles. In this event it may be concluded that she has "sensed" a cavity, and is now endeavouring to find an entrance to it. If the hollow space lies close beneath the surface the bee forces her way into it ; but if it should be deep down, and there is no mouse's hole leading into it or other means of access, she quits the spot and flies off to hunt in another place. But in this case it is always worth while to prod round about the spot with some sharp-pointed instrument, for the chances are that a hollow space will be detected.

These investigations, of course, involve some trouble and a considerable amount of patience, but the truth-seeker will not grudge the time thus spent.

If it were not for this sense perception which

empowers insects to discover concealed cavities, bees and wasps would never get into the odd places from which in late summer we see them emerging in vast numbers.

CHAPTER XXV

TELÆSTHESIA

TELÆSTHESIA—clairvoyant perception—accounts, I believe, not only for the “ homing ” instinct, but it is this same faculty (travelling clairvoyance) which enables birds of different species on migration to find their way to remote countries over hundreds, nay, thousands of miles of land and sea.

With seasonal regularity millions of birds journey to and fro from one continent to another. Birds of the year are, of course, making the journey for the first time. How do they achieve such an undertaking? “ Observation and memory ” theorists assert that the young birds are conducted by their parents, or others who have made the journey before. Let us consider what this really amounts to. Picture a case, the case of the Willow-Warbler, for instance.

The Willow-Warbler (*P. trochilus*) is a very small bird of weakly flying habit, nevertheless it is a long distance migrant. Supposing, then,

that a family of these warblers sets out on a journey from England to Africa. Starting from an inland place they have first to find their way to the coast, where, possibly, they fall in with other migrants bound in a southerly direction ; but being weak fliers they are unable to keep pace, and so are thrown on their own resources, viz., the supposed knowledge possessed by the parent birds of the route from England to Africa. Once out at sea, landmarks disappear and occasional fogs are encountered, to say nothing of the fact that birds on migration fly mostly *at night*, resting by day or on reaching land. However, after travelling thus for many days and nights, and covering anything over 1,000 miles, the party duly arrives, and from this one experience the young birds must be prepared, in six months' time, to retrace every mile of the way back, for by that time they will have become separated and lost to one another. (Most, if not all, male warblers arrive in advance of the females.)

If this case is insufficient to prove that it is not parental guidance which enables young birds to find their way to far distant climes, we shall turn to a migrant who can learn nothing from its parents: namely, the familiar cuckoo.

The cuckoo, with its hawk-like appearance,

is an outcast and shunned by the whole community of the feathered race. Far from tending and instructing their progeny, the parent cuckoos leave them to take their chance of being reared by a *non-migrating* species (usually), whilst they (the parents) quit the country some two months in advance of their offspring (known fact). And yet these young cuckoos, who are not gregarious and who may be seen singly, dotted about over the country, manage to find their way from far north (Norway) to Africa.

Observation and memory will not account for these performances ; but telæsthesia, a faculty of subconscious mind, covers the whole in a nutshell.

Telæsthesia—*perception at a distance or power of vision transcending time and space*—is, I believe, a subconscious faculty possessed by animals in a high degree. For reasons given, telæsthesia, like some other subconscious faculties, is but rarely manifested in man. There are, however, authentic cases of persons, in the trance or dream-state (when self-conscious mind is in abeyance), having very distinct visions of people and places with minute details of surroundings entirely unknown to the seer, but which afterwards have been verified. It is needless to quote instances,

for the fact of these occurrences is well known to most people. Sufficient, therefore, that telæsthesia is a fact, and one, I think, which goes far to solve the mystery of "homing"; and, moreover, it is by this means that birds, animals and others, find their way about, and, in the case of birds, to far-distant countries.

We have seen that birds, whether old or young, are capable of finding their way from Great Britain to Africa or elsewhere. But, whereas birds do so *naturally*, man, having practically no innate sense of direction, was forced to use his intelligence in the matter of travel and learn by experience how to find his way about. This could only be done by venturing a short way at first, taking mental notes of the surroundings, and then increasing the distances. When, however, his journeyings became extended it was necessary to record observations in black and white lest his memory should fail him. But still, when at sea and celestial indications were obliterated by fog and cloudy weather, he was at a loss, and so had to fall back on nature. He invented the Magnetic Compass, a material contrivance, but having an index imbued with *natural* power, a power of which he knew little beyond the fact that it was infallible and unaffected by distance. Furnished with this

NATURE LIKENED TO A VAST MACHINE '191
natural appliance, man, thenceforth, was able to steer a true course.

The Mariner's Compass supplied the one thing needful when lost on a trackless waste—a knowledge of direction.

As I have said, nature is like a vast machine, all of whose parts are connected and shade imperceptibly one into another, the whole actuated by a mainspring—All-Mind. Thus, the Force-of-Life flows continuously through the entire system ; but, as this machine is one—the only one—of perpetual motion, it is clear there can be no loss of power or waste of any kind. As surely as the life-force circulates, keeping the wheels in motion, so surely must it come round, eventually, to the source of emanation, as arterial life-blood returns to the heart ; otherwise the machine would not be one of perpetual motion, which the fact of eternity proves that it is.

O is the emblem of eternity, and rightly, for it has no beginning and no end. Now we observe in nature that all her works are carried on by a system of circles. From every point of view there appear globes, spheres, orbits and cycles. As an instance of nature's cycles : Vapour rises from the sea, condenses, falls on the mountains, is gathered into streams, whose waters find their way back to the ocean ; the

circuit is complete and continuous. The life-history of animate things demonstrates the same continuity. We have already traced the connections which link the ovum and perfect insect. Again, in the vegetable kingdom, there is the seed, the gradual evolution of the plant culminating in the flower, and seed again, *ad infinitum*.

The wheels of a man-made machine cannot revolve unless arranged in lines of connection ; nature is the same, there can be no motion or manifestation except the connections are complete. But, in nature's case, the links are often immaterial ; there exist those invisible connections which elude investigation.

The action of electricity, which may be said to transcend time and space, will perhaps illustrate my meaning. Before it can be energized, electric force must pass along a suitable conductor, which may be material, such as a metal wire, or, a psycho-physical medium (ether), as in wireless telegraphy. In any case, connection must be made, or there is no activity. We do not know what electricity is, but can always test it when operating with a material medium by filling in the last link which completes the circuit.

Telepathy and telæsthesia, if not identical with electricity, operate, I believe, in the same

way ; before results can obtain, circuitous connection must be established. But as these forces ply through a medium not apparent to sense, we cannot determine the necessary conditions.

Now, with regard to migrations, it is a well-known fact that migrating birds travel, for the most part, at night.¹ There is a reason for this. In the writer's belief, migration takes place at night because darkness (absence of sunlight) is a condition *favourable* to telæsthesia, in that it strengthens the connections.

When surrounded by obscurity there is nothing (not even landmarks) to distract the bird's attention ; subconscious mind, therefore, functions uninterruptedly. But when a bright light, such as a lighthouse, appears, the bird's physical eye is immediately attracted, the migrant is drawn towards the light, and if not shattered by coming in contact with the structure, is, for the time being, bewildered. The physical faculty has led to the disruption of the psychological connection, and until the former conditions are re-established the bird cannot proceed on its true course ; the consequence is, the unfortunate migrant batters itself in a vain endeavour. Thus, many

¹ It is noteworthy that the Marconi system works better at night than by day.

thousands never reach the land of which, so recently, they had a clear *vision*.

Though there are said to be day-dreamers as well as night-dreamers, the normal condition of the dream state is when the eyes are closed in darkness to the outer world and physical life is dormant. It is then we see mentally. This is a suggestive reflection, and may help to explain the functioning of the bird's subconscious mind. I do not imply the birds are asleep, far from it, but when pursuing a purposeful course they act in accordance with the only form of mentality they possess, which is subconscious, and functions on an astral plane. Man, as we have seen, also has access to this plane, when the conditions are such as to prevent the working of his self-conscious mind.

Though birds do not lose the power (*telæsthesia*) in the presence of ordinary light (the pigeon is evidence), I believe darkness to be the more favourable condition.

CHAPTER XXVI

MIGRATIONS

BEFORE setting out on migration, birds, the swallow tribe for instance, begin to collect at some point near the coast. For several days parties of these intending migrants continue to arrive from inland districts until a large number has assembled. Among them may be seen sand-martins, house-martins, and the common swallow. Telegraph wires are often chosen by these small-footed birds as in every way suitable for their mass-meeting. In serried files, almost touching one another, they sit on the wires in groups and companies, whilst others are hawking in the neighbourhood. Under these circumstances we have again an opportunity for observing telepathic mind-blending. Spontaneously, without incidental alarm of any kind, a batch of 50 or 100 birds is seen to quit the wires as if, literally, they had been struck off by an electric shock¹; but

¹ A bird perched on a telegraph wire is not affected by the electric current; this would only be possible in the unlikely event of its possessing one leg long enough to touch the ground beneath.

once on the wing they separate, each pursuing his own course in search of flies.

Swallows when feeding have no system of linked flight, nor perhaps at any time ; swifts, however, when not actually catering, perform wonderful combined evolutions at extraordinary speed. At these times the birds scream for the same reason that the travelling geese " gabble."

Though the swallows and martins are seen to leave the telegraph wires simultaneously, they come back independently and swing themselves up one after another, or in twos and threes, but when settled are again in telepathic sympathy.

One day the observer returns to find the birds gone, and concludes they must have left the night before. This is probably the case ; for though it may have fallen to the lot of some to have witnessed the final departure during the daytime, it would be exceptional, which points to the fact that the birds are in the habit of travelling at night.

What actually determines the psychological moment of departure we cannot say, though we may be sure that it is not a case of " making up their minds " ; birds have no minds, in that sense, to be made up, they cannot reason on abstract matters. However, we can surmise

that so soon as the necessary conditions are right, connection is made when the faculty, telæsthesia, comes into operation, and the birds, simultaneously, depart *en masse*.

Some maintain that the factors controlling migrations of birds are, first and foremost, the wind ; and secondly, the bird's knowledge of the way (landmarks?). These say, that when the wind blows cold from the north, it is a warning to the birds, who then take flight and are wafted in the right (southerly) direction. The same when returning, the hot wind from the desert brings them back ; if instinct is allowed, it is only of secondary consideration. This view seems hardly satisfactory, for it leaves too much to chance, whereas nature leaves nothing to chance.

That wind is one of the conditions I have no doubt whatever ; so are the wings of the bird a condition—both are natural means in aid of locomotion. But whether the wind blows hot or cold, the bird, even if affected by it, is not conscious of the fact ; if we admit that, it brings us again to the reasoning mind. In my belief, cold does not affect birds ; but what does affect them is lack of food, which is the primary cause of migration. Swallows sometimes arrive in extremely cold weather and, again, leave long before the cold weather

sets in. Therefore I opine that neither swallows nor any other bird of a temperate clime suffers from cold, but starvation soon puts an end to them.

Birds of certain species migrate in enormous companies which take days in passing ; others travel in comparatively small lots ; sometimes a mere handful is seen, and even single individuals make their way over a trackless sea. But none of these fly at random ; singly or in groups, they are psychologically connected up with their respective stations and travel without *thought* of losing their way ; a constant danger, however, is an adverse gale of wind. When this happens the birds are either beaten down and drowned, or forcibly driven hundreds of miles out of their course, when they turn up in regions quite outside of their natural limits. The occurrence of rare birds under these circumstances does not, of course, entitle the visitants to be claimed as indigenous to the countries in which they are identified and recorded. For instance, the Sand-Grouse (*Syrhaptes paradoxus*), periodically noted in Great Britain, is not, and never was, a British species.

However much encouraged and protected, this bird does not remain permanently ; and the same applies to many others. For this

reason it is practically useless to attempt to establish a species not indigenous to the country when that species has the *means* of escaping from it ; sooner or later subconscious mind urges the creature home, back to its native land.

The appearance of a migration of shore-birds flying out of sight of land over the surface of the ocean, is indeed significant of the infinite possibilities of nature, and ideally suggests " the Spirit of God moving upon the face of the waters . . . "

CHAPTER XXVII

MR. HUTCHINSON'S ACCOUNT ("CORNHILL")

REFERRING to Mr. Hutchinson's account in the *Cornhill*, *re* bird migrations in connection with the war, the *Globe* says :

" We have a vast collection of facts as to when and where birds migrate, but we can only conjecture how they accomplish their remarkable feats. The routes pursued by migratory birds, both in spring and autumn, are unchanging ; they have been observed, mapped out and recorded. But the war has already brought great disturbance into a region of natural life where for many years everything has been normal. Some unusual phenomena were observed last autumn, and, rightly or wrongly, the changes in the habits of various species of birds were attributed to the war. As yet, however, it is impossible to say definitely what has been the effect of the war upon the autumn migration. . . .

" Those birds which have made several nocturnal visits to our shores and the shores of

other lands, must have grown accustomed to certain definite appearances of the coast-lines ; they will, for example, have observed the lights of seaside towns and of lightships, and it is assumed by ornithologists that the appearances in no small measure act as guides to the birds. But, in the place of friendly and accustomed lights, the feathered creatures have witnessed ' the whole arch of heaven swept unceasingly by the immense search-lights ' projected from land and sea. It is difficult to believe that a large number of them have not already failed to find their way under these new conditions and strayed out of their course to strange and perhaps unsuitable lands. The sound of continuous cannon must also have affected the distribution of birds, but not until this turmoil is over shall we be able to study the exact changes in distribution that have taken place, nor shall we know whether those changes are permanent or only temporary."

That the disturbance in Northern France and Flanders will have some temporary effect on the distribution of birds seems inevitable. The matter is of considerable interest to ornithologists, who should endeavour to trace the wanderings of the spring migrants who, like the unfortunate human inhabitants, will be

compelled to fly from the stricken area. These human refugees have already sought shelter in countries beyond the zone of their natural haunts; but as these, it is to be hoped, will shortly be repatriated, so will the birds eventually settle down in their accustomed places.

Note.

Owing to the publication of this book having been delayed on account of the war, I am able to add a note to the effect that, contrary to all expectations, there has been *no* exodus of birds from the battlefields of France and Flanders.

An officer at the front, in an interesting article written to *The Times*, March 2nd, 1916, says: "The noise and bustle of war do not drive away the birds, not even from the trenches, and I can remember no nesting season which introduced more birds unknown to me than last summer."

The fact is, the birds, unreasoning creatures with no free will of their own, can but obey nature's ruling, which is not subject to alteration on account of incidental local disturbance. Therefore, in the face of danger, of which they know nothing, the birds keep on the same course and frequent the same places which for countless generations has been their custom.

The migrants, at the appointed times, automatically proceed to and fro between their stations, outside of which they have no knowledge or perception. The residents, by the same ruling, are confined to their home surroundings, notwithstanding "the noise and bustle of war." If forcibly ejected, "homing" instinct would infallibly bring them back.

This would seem the only possible explanation accounting for the birds' persistence in holding their own, and actually nesting in face of the turmoil of battle. Moreover, it is an item of evidence which strongly supports my contention, namely, that creatures do not act on their own responsibility, but are dependent on the ruling of subconscious mind. The evidence is important because unique; no one could have predicted what effect the war disturbance would have on the birds, for never in the world's history has there been anything like it from which we could form a judgment.

CHAPTER XXVIII

BIRDS IN EXISTENCE BEFORE LIGHTHOUSES

My endeavour in treating this subject has been to show *how* birds and others “accomplish their remarkable feats,” and if my convictions are in the track of truth, we must conclude that “definite appearances of coast-lines shown up by the projections of light from sea-side towns, lightships and lighthouses,” are a hindrance rather than a guide to the birds, and also that powerful searchlights would tend to baffle the migrants.

It must be remembered that migrating birds were in existence long before the erection of lighthouses and electrically lighted towns; therefore, if birds were capable of finding their way in times when the nights were unilluminated by artificial rays, it is presumable they can do so now. For though man, in consequence of his reasoning mind, has progressed and altered his ways of living, birds, who have not the same advantage, have retained their primal habits.

Possessed of a reasoning mind over and above his subconsciousness, man has acquired a certain stock of knowledge ; but this acquired knowledge is superficial compared with subconscious intelligence. Thus, whatever man learns or whatsoever he achieves, is the product of his mental labour ; for, unlike the birds, he has no accessible spontaneous knowledge—except, in the rare cases of *inspiration*, which is, in effect, upspringing intelligence of subconscious mind. Whether this be latent or results from extraneous influence, need not here be discussed. Under normal conditions all knowledge must be acquired, either by self-instruction or learned from another.

Example : Notwithstanding that the action of swimming is entirely different to that of land progression, a dog swims naturally (subconsciously) at the first attempt ; but man, who has had every opportunity for observing the actions of animals in the water, is, nevertheless, some time in acquiring the art—to him it is art.

The reason for this is, of course, that the man's self-conscious reasoning mind, deficient in these matters, overrules the other, the mind that *knows*, with the result that he has to *learn* to overcome fear conjured up by his

imagination and also practise the necessary body movements. Having learned, he relegates the knowledge to his instinctive (subconscious) mind and swims, like the dog, without mental effort. In the same way, a person knits, or plays the piano, without giving a thought to the matter. Although I instance knitting and playing on an instrument, these particular accomplishments are not native to subconscious mind in the way that swimming is natural; but like all acquired knowledge, it is possible to commit them to *memory*, which is the same subconscious mind. The commitment, however, is often a slow and difficult process; but once the knowledge is acquired it is always there, though not always accessible, because the connection which links the two minds is of a subtile nature; the "switch," so to speak, is apt to elude the grasp.

But to return to the effects of the war on animal life. Certain nature observers in this country have remarked on the odd behaviour of pheasants consequent on the disturbance now proceeding (January, 1916). Accounts from many districts have been sent up and recorded in the daily papers. These reports are interesting, for though there is nothing new in the fact that pheasant cocks crow and beat their wings in response to distant sounds,

it shows how acutely sensitive these, and probably all birds, are to vibrations which to the human ear are scarcely if at all perceptible.

Though we know the cause of these demonstrations, the question is, why should the birds be thus affected? To arrive at a possible solution of the problem we must as usual investigate the habits and character of the species. To begin with, we note that many birds of the gallinaceous order are polygamous: to wit, domestic fowls, pea-fowl, turkeys, black-game, etc., including pheasants. The male bird in all these cases is distinctly and distinguishably "cock of the walk." Paramount and supreme in his own run, the cock pheasant must needs live up to his reputation, *nemo me impune lacessit*, otherwise he will surely be deposed by one more valiant in the eyes of the female following. Naturally fierce and combative, the bird is ever on the *qui vive* and ready to tackle the first intruder who dares venture within his precincts; any overstepping of the boundary is the prelude to a fight. But, as a rule, the cocks, warned by the challenges heard in various directions, keep to their own ground. This perpetual "crowing," accompanied by "wing-drumming," is a natural provision and a very effective one, for it results in keeping the

parties at a safe distance from one another, which is exactly nature's intent.

The "crowing" is a subconscious act; metaphorically, a small but important "cog-wheel" in nature's machinery which ensures the proper working of the system. The movement might be described as a reciprocating arrangement. In plain words, the cock pheasant is so "strung" as to "go off" instantly on the impact of the sonorous vibrations set up by the "drumming" of his rivals, in the same way as a sounding note causes another of the same quality to reverberate in sympathy.

It is no stretch of the imagination, therefore, to believe that the distant booming of cannon, thunder and such-like sounds, have precisely the same effect on the birds, always accepting the premise, viz., that the said "drumming" is an automatic manifestation.

This view of the matter, to my mind, is confirmed by the fact that the pheasant (or turkey) ejaculates *quicker* than a human being can exclaim after hearing a sound. In the bird's case there is no *after*, the ejaculation is coincident with the sound. A general clamour continues for some time afterwards, but that is due to the cocks answering one another, independently.

Incidentally, it should be noted that pheasant *cocks* are furnished with erectile opercula (ear-covers). That these are specially adapted for intercepting and concentrating sound vibrations, there can be little doubt.

CHAPTER XXIX

TESTING THE PROPOSITION

IN writing of the subconscious mind in the Animal World, as it appears to me, I have described the acts of a variety of creatures belonging to widely separated classes in order to test the proposition from different aspects. In each case the evidence submitted tends strongly to prove the correctness of the thesis.

The old, and generally accepted idea, namely, that animals perform "their remarkable feats" by a process of reasoning (the pigeon taking notes of "the hills and the valleys" is typical of this belief), stands no testing whatever, it breaks down at every point; but if we believe that subconscious mind is integral of All-Mind, which is my contention, the "feats" of animals are not so "remarkable" as absolutely natural.

In attributing infallibility to subconscious mind, it is because a close study of nature has convinced me that such is the truth. The manifestations of subconscious mind are

apparent, not only in the actions of animals, but in all natural phenomena : such as the movements of the sun and planets in their orbits ; the ebb and flow of tides ; the regular succession of the seasons, etc. All these happenings are governed by the same unerring intelligence.

The idea of infallibility is difficult to realize because of the limitations of the self-conscious reasoning mind, which fails to grasp what is beyond personal experience.

“ Nature in her Divine purity ” *knows* without reasoning, therefore in *pure* nature all works well and harmoniously ; there is no evil, consequently no sin. What impurities exist arise from want of knowledge in the reasoning mind and so filter through to nature. The fallible reasoning mind is inconstant ; intuition and reason are at variance, hence discord and strife. But this opens out a large subject. In the meantime, it may be taken that until the human mind has attained to super-consciousness and is at one with the Infinite, impurities must apparently contaminate nature in many directions. Nevertheless, impurity is not a truly natural condition.

Too long have we been following in the old tracks ; so worn are they, indeed, as to have become positively ruts out of which it is

difficult to flounder. The line I have traced in this paper may indicate a path affording firmer footing. The highway to truth is assuredly in the study of natural history; nature's open book contains all we would know, could we but clearly decipher the language in which it is written.

Though it is true there are many more nature students to-day than existed, say, fifty years ago, and more accurate knowledge obtainable, still, the majority does not seem to realize the grave importance of this study. The world, in fact, is too busy to give heed to life functioning on a lower plane, notwithstanding that the knowledge intimately concerns humanity at large. Nevertheless, it will be noted that in arts and invention, science, in doubt or difficulty, invariably has to fall back upon nature.

Example : In course of development, flying machines are assuming more and more the bird-like form and poise, even to the upturned tip of the wing (Taube), which in some species of birds is more or less flexible. Eventually, I believe, the monoplane will supersede all other designs of aircraft, because truer to nature, who already has the perfect model. And yet, withal, we speak of "improving on nature." But this is impossible ; the most we can do is

to assist nature by eliminating detrimental factors and substituting those of a helpful character; but it is Nature herself who, taking advantage of the more favourable conditions, expends her surplus energy (Force-of-Life) in modifying the original type.

Nature can learn nothing from man, who is part of herself, but man can and will acquire from nature such knowledge as will eventually lead him to a real understanding of the *meaning of life*.

The more we study nature the more surely we realize that all her parts are linked together and *moved* by the One Spirit—ALL-MIND.

To quote Pope's admirable couplet, which refers to that—

“ stupendous whole,
Whose body nature is and God the soul.”

INDEX

A

Aeroplane, 62.
Aestivation, 163.
Addled egg, 56-8.
Antics, 98.
Antennæ, 24, 94.
Ants, 27.
Aquatic-birds, 100.

B

Baits, 171.
Bees, 176.
Birds' nests, 40.
Birds' eggs, 49.
Birds' flight, 62.
Birds' in connection with the war, 200.
Birds' sight, 121.
Birds' songs, 93.
Blackbird, 40.
Black-headed gull, 73.
Bombylius, 88.
Buff-tip, 37.

C

Cabbage-white, 8.
Coleoptera, 87.
Concealers, 99.
Corncrake, 97.
Crowned hornbill, 42.
Crowing, 206.
Cuckoo, 188.
Curlew, 100.
Cyclic system, 191.

D

Dog, scenting, 4.
Dog, swimming, 205.

Disease, 120.
Doves, 46.
Drumming, 207.
Duck-decoy, 146.
Dunlin, 107.

E

Eel, 136.
Eggar moth, 37.
Elephant, 148.
Emperor-moth, 17.
Equilibrium, 123.
Ermine moth, 38.
Exposers, 99.

F

Fabre (French naturalist), 34.
Firewood-gatherer, 47.
Flight, 77.
Freaks, 120.
Frogs, 134.

G

Geese, 105.
Golden plover, 106.
Golden oriole, 45.
Golden-crested wren, 45.
Gordius aquaticus, 136.
Green woodpecker, 83.
Group-souls, 28.
Grouse, packing, 112.
Guillemot, 52.

H

Hawk-moths, 90.
Hedge-sparrow, 50.

Heron, 72.
 Homing, 133, 203.
 Horse, 148.
 Hover-fly, 88.
 Humble bee, 184.
 Humming-bird, 88.
 Humming-bird moth, 87.
 Hybrids, 142.

I

Ichneumons, 14, 22.
 Insect-flight, 86.
 Instrumental music, 94.

J

Jack-snipe, 93.
 "Jock Scott," 158, 161.

K

Kelt, 170.

L

Laggards, 111.
 Leaders, 101, 102.
 Life-principle, 25.
 Lighthouse, 193.
 Long-tailed tit, 44.

M

Magpie, 47.
 Magnetic compass, 190.
Melitæa aurinia, 37.
 Mind-blending, 26, 28.

O

Ovipositor, 20, 22.
 Oxygen, 163.

P

Panic, 115.
 Parthenogenesis, 19.

Partridges, 110, 84.
 Pensile nests, 45.
 Pheasants, 206.
 Pied-flycatcher, 56.
 Pigeons, racing, 126.
 Pigeons, homing, 126.
 Pigeons, training, 131.
 Polygamous birds, 207.
 Prawn, 172.
 Prismatic mirror, 153.
 Processionary caterpillars, 29.
 Protections, 99.
 Puss-moth, 14.

Q

Quail, 110.
 Queen bee, 176.

R

Rhyssa persuasoria, 20.
 Robin, 123.
 Rooks, 108.

S

Sand-grouse, 198.
 Salmon, 155.
 Salmon flies, 157.
 Saw-flies, 38.
 Sheep, 113.
 Silken thread, 36.
 Sirex, 21.
 Skylarks, 153.
 Smolt, 139.
 Snipe, bleating, 95.
 Sounds, 92.
 Sounding-board, 95.
 Souls of animals, 25.
 Spider's web, 33.
 Stampede, 115.
 Swallows, migration of, 195.
 Swans, 65, 69.

T

Telæsthesia, 133, 187, 197.
 Telepathy, 1, 29, 69, 178.

Thrush, 119.
Toads, 134.
Trout, 139, 155.
Trout, white-trout, 141.
Trout, slob-trout, 141.

V

V-shape form of flight, 102.
Valve principle, 77.

W

Water-divining, 2.
Water ouzel, 42.
Warning colours, 99, 158.
Wasps, 186.
White admiral, 10.
Whitethroat, 40.
Wild-duck, mallard, 99.
Willow-warbler, 187.
Wood-warbler, 41.
Woodcock, 78, 122.
Woodpeckers, 83.
Worm, 171.