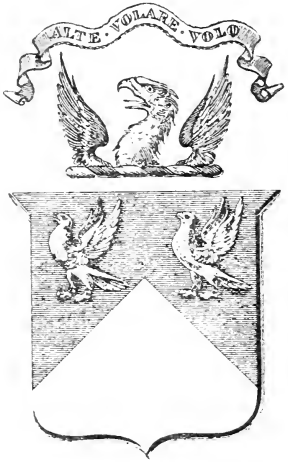

THE BEASTS, BIRDS, AND BEES OF VIRGIL

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THE BEASTS, BIRDS, AND BEES OF VIRGIL

A NATURALIST'S HANDBOOK TO THE GEORGICS

BY

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WITH A PREFACE BY
W. WARDE FOWLER

OXFORD
B. H. BLACKWELL, BROAD STREET
MCMXIV

TO

MY FATHER,

WHO GAVE ME MY FIRST LESSONS

IN VIRGIL

AND IN NATURAL HISTORY

'Thou that singest wheat and woodland,
Tilth and vineyard, hive and horse and herd;
All the charm of all the Muses
Often flowering in a lonely word.'

TENNYSON: *To Virgil.*

PREFACE

No book of classical antiquity makes quite such a strong appeal to Englishmen as the *Georgics*. For the average educated Englishman has in him something of the sportsman, something of the naturalist, and often at the back of his mind an inkling of the poet; long ago he had also in him a good deal of the farmer, and it looks as though this might be so again in the next generation. The *Georgics*, if he has the luck to come across them, are pretty sure to attract him in one way or another. I well remember, in the days of my college tutorship, having to push a sporting youth through the thorny hedge of Responsions—one who was totally incapable of understanding the rhetoric of Livy, with whom we first tried him; then in despair I put him on the *Georgics*, and adroitly began with the third. When he came to Virgil's

description of the horse's points, his face and his mind at once brightened; to use his own language, he 'found,' and thereafter took all his fences without a fall.

I think it was not only that he found things in the poem about which he knew a good deal —more, in fact, than I did—but that he unconsciously felt the life of the animals just as Virgil felt them. The mere fact that they have eyes and ears and feet and tails, and do certain things with them, showing the active mind within, is to the sportsman-naturalist a continual delight, and so I think it was to Virgil. Every animal in the *Georgics* is full of life, constantly in action for some definite end. Open them anywhere, and you find at once this intensity of life, sometimes expressed in a single wonderful word. The reason of this is that the poet had in an unusual degree the true Italian feeling that there is something mysterious or divine in all life, even in that of plants—a feeling at the root of the religion of the early Italians, though less recognizable among those of to-day.

It is because Mr. Royds in this little book

seems to me to give us substantial help in understanding this life as Virgil and the old Italians felt it, that I heartily welcome it, hoping that it may make its way among all English-speaking peoples, and lead them to a better knowledge of our beloved poet. It is, I think, the best commentary we have for the naturalist, the farmer, or the sportsman. I have learnt from it much that I did not know before, and feel that I may confidently recommend it to all scholars.

W. WARDE FOWLER

INTRODUCTION

THE ancient naturalists do not on the whole add much to our knowledge. This book might have been considerably enlarged by copying all the passages from Aristotle, Varro, Pliny, and Columella, which the industry of commentators has gathered; but merely to show how far these agree or disagree with Virgil, or have copied or been copied by him, would, as a rule, be to repeat what others have already done. Varro's importance lies mainly in the fact that he is earlier than Virgil and supplied him with a good deal of matter. Pliny has an unfortunate habit of describing fact and fiction with impartial accuracy. Columella is in some ways the best expositor of Virgil, but was inclined to put too much faith in him, as appears from such phrases as 'si verissimo vati velut oraculo crediderimus' (i. 4), or 'utamur enim saepius auctoritate divini carminis' (vii. 3-9), or 'ne decedamus ab optimo vate' (ii. 2). Holdsworth regards his work as 'much the best comment on the *Georgics*,' but admits that he never differs from him but in one single point.

But Aristotle must be placed in a different category. Mr. Warde Fowler calls him 'of all naturalists down to the time of Willughby and Ray the most exact

and trustworthy.' Virgil was considerably indebted to his *Historia Animalium*, the ninth book of which repays careful study.

Quotations from these writers have not been entirely excluded, but an attempt has been made to select the more interesting and important of them, and to supply a few which have not appeared elsewhere.

Of the commentators Keightley is the only one who shows a general knowledge of natural history and outdoor life. His work is peculiarly valuable because he resided for some time in Italy. But he wrote nearly seventy years ago, and on the subject of bees he is almost as ill-informed as the rest. Holdsworth's book is occasionally useful for the same reason as Keightley's. 'He made more journeys to Italy than perhaps any gentleman in this age, studied Virgil's works, in particular, on the very spot where he wrote them.' But he was not a naturalist, and he died in 1746. Martyn was a Professor of Botany at Cambridge, but knew very little of other branches of natural history. He wrote in 1740. The works of these three commentators are now out of print.

Conington's work is indispensable; but neither he nor any of the others, except occasionally Page, are of much value for our purpose. Moreover, most of them have studied Virgil from a too exclusively English standpoint. Hence Bible naturalists such as Tristram and J. G. Wood, though they make no conscious reference to Virgil, often throw interesting sidelights on him from the East.

It must be admitted that Virgil's science made no

great advance on that of his predecessors. If Lucretius, for instance, had written a *Georgic* on bees, it would doubtless have been more accurate than Virgil's. But it would have been a very poor substitute for it. Virgil has borrowed freely from older writings, possibly including, as Sellar thinks, the lost Μελισσουργικά of Nicander. But he shows what has been happily termed 'the inspiration of selection.' He not merely omits a good many of their mistakes and includes observations of his own, but he is never tedious. He writes with the religious feeling of the true poet, and with that 'tender affection for the whole creation of God' which belongs to the true naturalist. In the words of Professor J. A. Thomson: 'To those who are fortunate enough to have in any measure the spirit of the true naturalist—as we see it, for instance, in types so different as Gilbert White, William Macgillivray, and Charles Darwin—nothing is common or unclean. They have a curiosity that is catholic in its tastes.'

Mr. Warde Fowler made a special study of Virgil's birds, 'partly because the ability to read and understand him is to me one of the things which make life most worth living, and partly because I know that there is no other Latin poet who felt in the same degree the beauty and the mystery of animals.' Virgil is at his best in those idyllic pictures such as the conclusion of the second *Georgic*, with its denunciation of slaughtering oxen for food (*Georg.* ii. 537; *cf.* Ovid, *Met.* xv. 72-142), or the description of the dying ox in the third *Georgic* (iii. 515-530).

The fourth *Georgic* is farthest of all from the truth as science, but perhaps the most beautiful of all. It is not surprising that it contains many mistakes, for Virgil's commentators are almost as much in the dark as he was. Evelyn mentions in his *Diary* (July 13, 1654) that he acquired a transparent apiary, which he kept for many years and exhibited to the King; nevertheless, observation hives and scientific apiculture are quite a modern institution.

Virgil, writes the Rev. J. W. Digges, 'put forward in verse the results of his study of the habits of bees, with a degree of accuracy sufficient to excite a wondering admiration on the part of twentieth-century readers. But to the average beekeeper the hive, until comparatively recent times, was as a sealed book. . . . The heroic acts and incomparable works were wrought, like evil deeds, in darkness: and man, loving only the visible, the tangible, sceptic always of the unseen, had not learned that within the secret places of the hive were enshrined mystery upon mystery, and that within the humming insect, flitting in his garden from flower to flower, there beat a heart brave and noble enough to deserve his respect and even to awaken his love.'

Little as he knew about the inside of a hive, Virgil loved his bees, and through them most of all saw

'Universal Nature moved by Universal Mind.'

Here and there it has been found possible to vindicate him against his critics, and a good deal of commenting on commentators and copying from

them seemed unavoidable. A large number of questions must be left open, but however many errors later research may expose in the *Georgics*, their greatness is imperishable, for Virgil was a great poet, and studied Nature less as a critic and teacher than as a reverent and prayerful disciple. Moreover he was, in Tennyson's well-known words,

> 'Wielder of the stateliest measure
> Ever moulded by the lips of man.'

It remains to say something of the scope and purpose of this book. Its main object is, firstly, to discover Virgil's meaning, and secondly, to bring it into relation with modern knowledge. It does not pretend to be a complete commentary on his natural history. But his zoology, ornithology, and entomology are almost all contained in the *Georgics*. Pigeons might have been included from the *Eclogues*, but Mr. Warde Fowler has discussed them admirably in his book, and I have nothing to add to what he has said.

Those who use my translation with this book will sometimes find that they disagree with one another. The translation was published in 1907, and since then I have seen reason to revise some of my interpretations.

If I have saved some future commentator from copying the worst blunders of his predecessors, I shall not have written in vain; but in the hope of appealing to a wider circle, especially fellow-bee-keepers and the higher forms at public schools, I have included a good deal of matter that struck me

as interesting, though not always strictly relevant to an exposition of Virgil.

Whatever accuracy I have attained in special knowledge of the subjects treated is largely due to the kind help of those experts to whom I submitted doubtful points. In particular I have to thank Mr. Bertrand Secker, veterinary surgeon, of Malvern Link, for help with Part I.; and Police-Constable Jesse Johnson, bee expert, of Haughton, Staffordshire, for supplying me with the most up-to-date literature on bees. In Part II. my greatest debt is to Mr. Warde Fowler's chapter on The Birds of Virgil in his book, *A Year with the Birds*. Mr. L. E. Upcott of Marlborough has read my work in manuscript, and supplied me with some interesting notes, which form Appendix B. I am glad to include anything from one whom I remember as such an inspiring teacher of the *Georgics* in my school-days.

I ought to add that I did not consult Mr. Warde Fowler personally until after this book was finished, so that I must take full responsibility for my conclusions, while thanking him most gratefully for reading the proof-sheets, and for his great kindness in consenting to write a Preface. There is no one from whom I would more gladly have accepted this favour, and no one better qualified to bestow it.

T. F. R.

Bollington Vicarage,
Altrincham,
August, 1913.

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THE BEASTS, BIRDS, AND BEES OF VIRGIL

PART I

BEASTS, AND INSECTS OTHER THAN BEES

§ 1. HORSES, CATTLE, ETC.

HORSES and cattle form the central interest of the third *Georgic*, the first 300 lines being devoted almost entirely to them. After a conventional prologue (1-39), and brief invocation of the hunting instinct (40-45), Virgil settles down to his theme. His horses are chargers and racers, not intended for agricultural work, which is done by oxen; as appears from *Georgic* i., and is implied in 49-50 of this book.

Hence the breed of cow must have size and strength, rather than elegance (51-52). The heavy dewlap is still sought by breeders as an indication of square and strong build (53). Length of body is desirable, that the cow may be 'roomy' for her calf (54).

Colour is simply a matter of taste (56) and of the particular breed. With the exception of the hoof all the details are selected from Varro.[1] Buffon follows Virgil in recommending that the ears should be large and hairy, the dewlap long and reaching down to the knees, and the tail touching the ground. He adds that cows may also be used for ploughing.

It is rare now in England to see farm work done by oxen, but by no means unknown. Any breed may be used, and will gain size from the work. The large South Devon oxen were still used at Poulton, a farm near Marlborough, fifteen years ago, but have now disappeared.[2] Both sides of the hoof are shod, and in any case a large hoof is an advantage.

Bulls are rarely used now, but 'taurus' and 'bos' are interchangeable in *Georgic* i., and perhaps not merely for metrical reasons. The writer has seen two bulls yoked together in a cart in the Grand Canary.[3] They are even ridden occasionally. A photograph of a bull carrying his owner has appeared in *Country Life*, and a Staffordshire farmer now living[4] remembers one which was said to have carried a farm boy to hounds for two miles. Commentators who make 'taurus' equivalent to 'bos' or 'iuvencus' are therefore not entirely justified.

The rules for breeding (60-62) are very safe for the cow, and Virgil's practice is much better than that

[1] R. R., ii. 5, 7-8 [2] Appendix A, § 1.

[3] *Cf.* J. G. Wood, *Bible Animals*, p. 109. In Palestine a pair of bulls may constantly be seen attached to the same yoke.

[4] Mr. Joseph Bettelley of Haughton.

of beginning to use them at fifteen months, as is frequently done. Two years, however, are not too young an age, and the cow herself will decide when she is unable to breed any longer from age. Bulls should be young (63-64). Unless valuable for show purposes they are usually converted into beef after four years. Older bulls are apt to grow too heavy, and have even been known to break a cow's thighs.

The touch of pessimism in 66-68, is not specially relevant, but very characteristic of Virgil (*cf.* i. 198). Dr. Johnson used to recite it with infinite pathos.

The description of a well-bred horse (75-88) is very good. 'Mollia crura reponit' suggests the walk of a thoroughbred. Ennius applies it to cranes, and it may be observed in the common moorhen. The foot is well picked up and the movements light and springy.[1] Courage is essential for racing, hunting, or war (77-79). *Cf.* 182-184.

The head should be well carried and need no bearing-rein (79), fine and tapering—'thin and meagre' (Buffon)—'a head like a snake' (Whyte Melville) (80); but it should be broad between the eyes, for brains are wanted. The short barrel and muscular back and chest suggest a weight-carrying hunter. The 'duplex spina' (87) is another point of the same kind. It means a backbone sunk between two ridges of flesh, owing to the development of the *longissimus dorsi* muscle; and may be observed in all

[1] Xenophon (*De Re Eq.* i. 6) uses ὑγρός in this sense: τά γε μὴν γόνατα ἢν βαδίζων ὁ πῶλος ὑγρῶς κάμπτῃ, κ.τ.λ. *Cf.* Appendix B, § 1.

horses of powerful build. A sound hoof (88) was very necessary to an unshod horse.[1]

The parenthesis on colour cannot be endorsed. 'A good horse cannot be of a bad colour.' 'Spadices' are bay, Xenophon's favourite colour. 'Glauci' are either grey or blue roan. 'Gilvus' is probably dun, but may be chestnut. Horses are rarely born white, and perhaps Virgil's dislike for these is due to this fact. But a white foal, 'Snowdrop,' whose portrait appeared in *The Field*, of February 17, 1912, took a prize at Dublin in 1911; and many good hunters are white. Dun is the usual colour of the Devonshire pack-horse, an excellent weight carrier. Many good thoroughbreds, including Eclipse, have been chestnuts, but a pale chestnut is not, as a rule, a good horse. Golden chestnut is an Arab colour, and very beautiful when the sun shines on it.

It is curious that in *Aen.*, xii. 84, Virgil praises white horses, but these, like the Homeric horses in *Iliad*, x. 437, are semi-mythical.

There are many famous parallels to Virgil's passage on the horse. First among them, and finest of all, is Job xxxix. 19-25, which should be read in the Revised Version, with the margin in verse 24. Shakespeare has a well-known description in *Venus and Adonis*. It is remarkable that neither Virgil nor he mention the importance of a well-laid shoulder,

[1] *Cf.* Xen., *De Re Eq.* i. 3, ὥσπερ γὰρ κύμβαλον ψοφεῖ πρὸς τῷ δαπέδῳ ἡ κοίλη ὁπλή (*cf.* iv. 3); *cf.* Isa. v. 28, 'hoofs like flint,' and Homer's κρατερώνυχες ἵπποι; Mic. iv. 13, 'I will make thy hoofs brass.'

so essential in the eyes of modern judges. For a short portrait Whyte Melville's would be hard to excel, though the 'snake' is questionable:

> 'A head like a snake, and a skin like a mouse;
> An eye like a woman's, bright, gentle, and brown,
> With loins and a back that would carry a house,
> And quarters to lift him smack over a town.'

Layard's *New Discoveries*[1] has an interesting passage: 'Although docile as a lamb, and requiring no other guide than the halter, when the Arab mare hears the war-cry of the tribe, and sees the quivering spear of her rider, her eyes glitter with fire, her blood-red nostrils open wide, her neck is nobly arched, and her tail and mane are raised and spread out to the wind. The Bedouin proverb says that a high-bred mare, when at full speed, should hide her rider between her neck and her tail.'

The 'collectum ignem' (85) may be partly a reminiscence of fire-breathing dragons, like that of Job's crocodile;[2] *cf. Georg.*, ii. 140, and Lucr., v. 29, where the same phrase occurs ('spirantes naribus ignem'). But the red, dilated nostril of the excited or 'blowing' horse is a sufficient explanation:

> 'His nostrils drink the air, and forth again,
> As from a furnace, vapours doth he send.'
> *Venus and Adonis.*

Cf. Aeschylus, *Septem*, 393-394, and Byron, *Destruction of Sennacherib*, 'And there lay the steed,' etc.

[1] P. 330. [2] Job xli. 19-21.

Kingsley knew how to depict the excitement of a hunter in his *Prose Idylls*. The same essay, *My Winter Garden*, contains a portrait of a foxhound which will stand comparison with either Virgil or Job.

The 'densa iuba' (86), denoting the thick crest of the stallion, was used, according to Conington's note, for mounting on the right side of the horse.[1] Manes are still worn on the off-side of the neck, but this is no obstacle to their being used for mounting, to assist the left hand. A hogged mane is no longer considered an eyesore in the hunting-field, but there was a time when hunting men were ashamed to be seen with a maneless horse.

'Hinnitu acuto' (94) is characteristic of the stallion's neigh, which is shrill, like the bellowing of a bull, as contrasted with the voice of the ox or cow.[2]

With regard to the limit of age for stud purposes (95-100), stallions, unlike bulls, are frequently used at twenty years and over. Being gentler and slower in their movements, their weight is not dangerous. Moreover, they are of little value when killed. But they must be perfectly sound, and, in any case, young horses are preferable.

The caution in 100-102 is perhaps intended to balance the details of the earlier description. 'Points' are not everything. Horses 'go in all shapes,' as in all colours. The main desideratum

[1] Appendix B, § 2.

[2] *Cf.* White's *Selborne*. *Letter XXXII., to Barrington.*

is symmetry. Action is the best test of shape, but neither is infallible. Thomas Assheton Smith had a celebrated hunter,[1] which was so bad a hack that he was always led to covert. To take an instance from the kennel: 'Squire' Osbaldeston's great stud-hound, Furrier, was drafted from Belvoir for crooked forelegs. 'Prolemque parentum' (101) is very important. It is an old saying and a good one that, *ceteris paribus*, 'blood will tell.' Many men will ride none but thoroughbred hunters. Speed, courage, and stamina, all depend largely on blood. (Attempts are now being made, on Mendelian principles, to produce a distinct type of thoroughbred hunter.)

The chariot-race which follows (103-112) is partly an imitation of Homer, but Virgil need not fear comparison with his original. He is evidently a lover of the sport. It is remarkable that both the first and the second *Georgics* end with an allusion to it. It occurs in the prelude to this book (18), and again in 180 and 202. In i. 59 mares are preferred to horses. Keightley says they are fleeter, but this is not true. Mares certainly have more stamina and more intelligence then the average gelding; but as the ancients did not castrate, we must suppose that mares were preferred to stallions for the same reason that they are now.

Even in Buffon's time, if we may trust him, castration was unknown in Persia, Arabia, and many Eastern countries. It is hardly ever used in the East to-day for horses and donkeys. The man who

[1] Named Ayston. He was 'pigeon-toed.'

'quattuor ausus iungere equos' (113) would be bold indeed if they were all stallions.[1]

In 115-117 we have the training-ring, in which it is still usual to 'ring,' 'lunge' or 'longe,' a young horse.[2] But 'impositi dorso' and 'equitem' suggest that, as Page thinks, the reference is to military training. Soldiers learning to ride may be seen following one another round in a ring. But here the training of the horse is obviously the chief consideration, and Keightley says the ancients *rode* their horses round where we should simply lunge them at the end of a rope.

'Gressus glomerare superbos' may be either graceful cantering, or high action,[3] as seen in those modern trotters which are 'superbi' rather than 'cursibus acres.'[4] Action is chiefly inbred, but it used to be improved by placing logs in the ring, and the Americans have a system of weighting the feet.[5] Show hackneys are often heavily shod to make them pick up their feet higher. The same kind of training is alluded to in 191-2. It suggests the French *manège* and *haute école* style of riding.

[1] Aristotle deals with castration at the end of book ix., but does not mention horses. Varro mentions that of sheep and pigs and fowls (ii. 2, 18, and 4, 21, and iii. 9, 3).

[2] Appendix B, § 3.

[3] J. G. Wood, *Bible Animals*, p. 263. 'High action seems to have been even more valued among the ancients than by ourselves, and some of the sculptures show the horses with their knees almost touching their noses.'

[4] Appendix B, § 4.

[5] Weighting the feet is mostly done in trotting races to prevent 'breaking.'

The advice given in 123-137 is good in the case of any animal. The male should be fed high to strengthen him for his task, and the female not allowed to grow fat, else she is liable not to 'hold.'

'Ipsa armenta' (129) is generally understood of the brood-mares. La Cerda, quoted by Martyn, refers the whole passage to bulls and cows only.

'Armenta' is parallel to 'pecori' (125), and probably Virgil has both mares and cows in mind, as Martyn and Keightley think. He is here beginning to make a transition from horses to cattle again.

Threshing-time (133) is very late for putting the mare to the horse, even if it was as early as July. On the other hand, line 132 does not suit the cows; but Keightley suggests that 'sole fatigant' may refer to the cows for threshing work. The whole question is very fully discussed by Martyn.

Excellent advice is given again in 138-145. Mares in foal must not be allowed violent exercise, but they may do light farm work almost up to within a day of foaling. 'Saltu superare viam' (141) probably does not mean to leap over or out of a road, but simply to gallop along it.

The description of the asilus (146-151) is copied by Kirby and Spence in their work on insects. It is not a whit exaggerated. Martyn gives an account from Vallisnieri of the terror the asilus inspires among cattle. The usual Latin name is *tabanus*, and the Greek for it is either *οἶστρος* or *μύωψ*. Aristotle distinguishes these. There are several species known

in England, and Virgil's is probably the *Tabanus bovinus*,[1] or Great Gadfly. There are also the *Oestrus bovis* and the *Oestrus ovis*, and the *Gastrophilus equi*, horse-fly or bot-fly. J. G. Wood, in his *Insects at Home*, describes how the *Tabanus bovinus* attacked him in the New Forest, piercing a stout tweed coat and flannel shirt till the blood streamed down him. The mere buzz of one of these insects is enough to send a cow scampering about in terror, tail in air:

> 'The breese upon her, like a cow in June,
> Hoists sail and flies.'
> *Antony and Cleopatra*, iii. 8.

> 'The herd hath more annoyance by the breese
> Than by the tiger.'
> *Troilus and Cressida*, i. 3.

The gadfly is frequently used in simile and metaphor by classical authors—*e.g.*, of the suitors in *Odyssey* 22. 229, and in Aeschylus, *Supp.*, 307, where both names occur—

> 'βοηλάτην μύωπα κινητήριον.
> οἶστρον καλοῦσιν αὐτὸν οἱ Νείλου πέλας.'

Cattle may be protected from it by preventive dressing. J. G. Wood discovered that paraffin oil kept it entirely away.

Branding (158), also mentioned in i. 263, is not usual now, except on large cattle-ranches such as those of the Argentine Republic. But an inconspicuous mark is sometimes made in the ear, es-

[1] Now called in Italy 'Tavano' (Holdsworth). *Tabanus* is properly a 'breese-fly,' and *Oestrus* a 'warble-fly.'

pecially of valuable pedigree stock. It is regularly used on desert-bred Arabs and camels.

'Cetera armenta' (162) includes all who are not the 'quos' of the following line. These latter must be taken in hand early, like the colt of 187-9. Calves are apt to be wild unless handled early; especially if allowed to run with the cow, as Virgil advises in 179. This is done in Herefordshire, and is best for early fattening and show purposes, but is more expensive. 'Frumenta sata' must mean corn in the blade, as Blackmore and Dryden translate it. (Rhoades understands it of plucking ears of corn by hand. Mackail takes 'manu' with 'sata'—'the corn sown by thine hand.') It is true that growing corn is not now given to calves, but the custom of allowing sheep to eat off the first growth is by no means obsolete. It is a good plan in a forward spring. Virgil himself recommends it in *Georg.* i. 112.

The training of chargers and racers is taken up again in 179 *et seq.* Horses are naturally timid, being accustomed to trust to speed rather than strength for protection in their wild state. But if their training is begun early and accomplished gradually, they may be taught to face almost anything. Weaning-time is none too soon to begin handling a colt (187). The use of the halter then will save trouble later.

As a three-year-old (190) his real training begins. 'We rashly run two-year-olds,' as Page remarks, 'but the chariot-race would be a severer strain than modern racing.' Even now, a horse is considered quite young enough for general purposes at four years.

'Laboranti similis' (193) suggests disciplined strength, the free action of an eager horse restrained and guided by the trainer. The special attention to his paces may have some reference to the 'Belgica esseda' of 204. It was originally the war-chariot of the Belgae and Britons, but became a fashionable carriage at Rome in Caesar's time.

Buffon observes that Neapolitan horses are excellent for carriages. They are large-headed and thick necked, but stately, spirited and graceful. We cannot, however, be certain whether Virgil is referring to the 'essedum' as a private carriage or as a war-chariot.

The 'farrago' (205) was a mixture of green food, in which 'far,' or 'spelt' predominated. This would be very wholesome, for high feeding must not be begun suddenly. A sudden change from grass to corn, especially young corn, is apt to cause eruptions on the legs.

From 203 and 208 it appears that severe bits were in vogue, and that some horses were resolute enough to pull against them. A confirmed puller is sometimes cured now with a plain snaffle softened with an indiarubber covering. Cruel bits are seldom used by good horsemen.[1]

Rival bulls occupy the next 30 lines. Fights such as Virgil describes would be frequent enough if they were made possible. Bulls are usually best kept solitary, though not for the reasons assigned in 215 *et seq.* In some parts of England it is common enough to let them run with the herd, as rams are

[1] Appendix B, § 5.

allowed to do with sheep, but they are apt to become dangerous.

In 230 most editors read 'pernox,' which makes much the best sense. Conington preferred it, but Nettleship and Haverfield have altered it to 'pernix' in deference to superior manuscript authority. The fodder of line 231 would certainly not be willingly chosen by the bull. Probably Virgil is reflecting the old superstition that hard fare produces hard muscles.

'Irasci in cornua' (232) may be paralleled from *Eclogue* iii. 87, as well as traced to *Bacchae* 732, which all commentators quote. There is no need to seek any elaborate explanation. Bulls may often be seen shaking their heads and tossing loose earth with their horns. The 'pedibus' of *Eclogue* iii. 87 may have led Keightley to translate 'sparsa,' etc. by 'and throws up the sand with his heels.'

'Ventosque lacessit' suggests Dares in *Aeneid* v. 377: 'Verberat ictibus auras,' or St. Paul in 1 Corinthians ix. 26, 'So box I, not as one that beateth the air.'

242-4 introduce a long passage, of which the theme is 'amor omnibus idem.' It is well known that nearly all wild male animals and birds become bold and pugnacious in the breeding season, and that females with young will face almost any foe. Stags in the rutting season (265) are a well-chosen instance of the former.

The 'aper' of 248 has by some commentators been distinguished from the 'Sabellicus sus' of 255. Martyn supports them, translating: '*even* the Sabel-

lian boar'—*i.e.*, the tame pig. But the context, and the epithet 'Sabellicus,' are against him. Moreover, Aristotle's description of the fighting boars, referred to by Conington and Page, agrees with Virgil; and his are wild boars.[1] He also says 'the boar fights even with the wolf' (*H. A.* viii. 6), which is probably quite true. The wild boar of India is known to sportsmen as the bravest beast on earth. A recent book[2] contains the following description: 'The boar is never afraid. . . . Once a boar has determined to fight, it is to the death, without flinching. . . . I have seen him, with two spears swaying from his flanks, charge horse after horse, to their riders' discomfiture, until he received his death-stroke—to sink without a sob.' The 'Sabellicus sus' is undoubtedly the wild boar, and no finer example of pugnacity could have been chosen. The domestic, acorn-eating swine of the first and second *Georgics* (i. 400, ii. 72 and 520) would have been ridiculous here.

With line 266 we reach the climax of the passage, which has been partly anticipated in 250-254. The belief that mares could conceive by the wind was universal among ancient authors, as the commentators show. 'So general was the belief,' says Keightley, 'that Lactantius' (iv. 2) 'employs it as an illustration of the miraculous conception of the Virgin Mary.' Virgil shares Aristotle's caution in not mentioning the birth of foals from this cause, but 'gravidae' really implies it.

[1] *H. A.* vi. 18, 1.

[2] Sir E. Durand, *Rifle, Rod, and Spear in the East.*

The 'hippomanes is, according to Virgil, the sign of heat in the mare. Apparently it was also used of two other things—a plant of the spurge kind, and a supposed tubercle on the forehead of the new-born foal. Virgil in 282-283 is recalling Aristotle, who mentions the hippomanes in H. A. vi. 22, and viii. 24,[1] and its use in sorcery: 'witches seek for it and collect it.' *Murray's English Dictionary* quotes Tytler's *History of Scotland* (1864, iv. 201) to the effect that poison was compounded by the wizard of adders' skins, toads' skins, and the hippomanes in the head of a young foal. There is a piece of flesh resembling liver in the 'liquor amnii' which envelopes the unborn foal, and this seems to be the origin of the hippomanes superstition. Some grooms assert that if dried and rubbed on the hands it gives power to tame the most savage animals, and that mixed with a drink it is a human aphrodisiac.

With 287 we pass to sheep and goats. Sheep are to be nursed in winter (296-298), to prevent disease. Such treatment is not given them now, except in the lambing-pens. 'Scabiem' is scab, and 'podagras probably foot-rot, both still common. The former is dealt with at greater length in 441 *et seq.* (Sandy soil, dirt, and wet, cause foot-root. No germ is at present known.)

The goat (300) is evidently a favourite with Virgil,

[1] He distinguishes it here from the πῶλιον, which Liddell and Scott explain as the membrane round the unborn foal. Virgil appears to confuse two senses of hippomanes in 281 and 282.

in spite of his strictures in *Georgic* ii.[1] There is a good deal to be said in his support. The goat usually breeds once a year, but if well cared for will do so twice, and drop two or three at a birth—occasionally four. She will give up to two quarts of milk a day after kidding. Three are on record. Goats are quite capable of 'roughing it,' but do better if housed in winter.

The great drawback to keeping them is that they will ruin every fence or young tree within reach if not tethered (*cf.* 314-315 and *Georg.* ii. 196 and 380). 'A goat will leave the finest pasture and the richest fodder to eat the twigs of the thorniest hedge or to gnaw the bark of a tree. Wherever you see goats kept on good enclosed land—unless they are always tethered—there you will see all hedges die, and a complete absence of all young trees.'[2] This is quite sufficient to explain the 'urentes' of ii. 196, and the 'venenum' of ii. 378. The 'capreae' of ii. 374 are roe-deer.[3]

Tristram[4] asserts that goats have actually extirpated many species of trees in the Holy Land, and 'after the ebony forests had been cut down in the island of St. Helena, the goats completely extirpated the young plants, until the tree had become utterly extinct.' He also confirms line 316: 'Fully sensible of the danger of remaining unprotected, they hurry

[1] *Cf.* the *Eclogues, passim.* [2] *Country Life,* April 1, 1911.

[3] 'Tondent dumeta' (i. 15) probably means 'browse *in* the thickets.' So Sellar translates it.

[4] *Nat. Hist. of Bible,* pp. 89, 92.

homewards of their own accord as soon as the sun begins to decline.'

'The magnificent winter-piece,'[1] as Churton Collins called it, has found an imitator in Thomson, *e.g.*:

> 'Drooping, the labourer-ox
> Stands cover'd o'er with snow, and then demands
> The fruit of all his toil.'
>
> (*Cf.* 368-370.)

The allusion to dogs and stag-hunting will be noticed later on. Virgil recurs to it in 404-413.

Sheep and goats occupy 384-403 for wool and milk respectively. 'Aspera silva lappaeque tribolique' (*cf.* i. 152) tear the wool, and even the flesh (*cf.* 444). In Genesis xxii. 13, a ram is caught in a thicket by his horns. 'Pabula laeta' produce more fat than wool. Down-fed sheep produce the best wool in England.

The superstition about the colour of the ram's tongue—found also in Aristotle, Varro, Columella, and Pliny—has a curious basis in fact. The story of the ring-straked, speckled, and spotted sheep in Genesis xxx. is by no means incredible. A chestnut mare, put to a chestnut horse in the presence of a piebald pony, has been known to drop a piebald foal, and the experiment has been repeated with a zebra in place of the pony. 'Birth-marks' on human beings are said to be sometimes due to some pre-natal suggestion in the mind of the mother. But it is difficult to see how the tongue of the ram, which the ewe would not see, could affect the fleece of his progeny.

[1] *Winter*, 240.

In ii. 150 'bis gravidae pecudes' must include sheep.[1] Sheep in England are not allowed to breed twice a year. Their period of gestation is 150 days, as against 120 in the goat, and they usually have fewer at a birth. Hence 'densior hinc suboles' of the goat in 308.

It is remarkable that milk (394) is treated solely with reference to goats.[2] That of the cows was apparently to be devoted entirely to the calves (*cf.* 176-178). 'Salsas herbas' probably means that salt is to be mixed with the food, as is frequently done now. It is a preventive of liver-rot,[3] or fluke disease, and worms in sheep. All herbivorous animals are fond of salt, as hunters are well aware. Lying in wait at a 'salt-lick' is a favourite device for securing antelopes. Buffon says that both vinegar and salt may be mixed with grass. The effect on the flavour of the milk is not noticeable (397). But salt creates thirst, and water is needed for the production of milk. Keightley is wrong in saying that sheep, except Southdowns, never drink unless diseased. They drink freely after lambing, and may be observed drinking at other times, especially if their food is dry.[4] No doubt dew will take the place of water

[1] *Cf.* Columella, vii. 2.

[2] Sheep's milk is also peculiarly rich, and esteemed above that of cows in the East. There may be an allusion to it, by contrast, in 308.

[3] This is said to be unknown on the English salt marshes.

[4] *Nat. Hist. of Bible*, p. 141. Tristram says: 'In the East the sheep requires water daily owing to the heat and dryness of the climate.' He wrongly adds: 'Whereas in England it

to some extent (326), but Virgil also mentions water just below it (330 and 335). Aristotle[1] says drinking fattens sheep, and advises salt to make them thirsty.

The 'capistrum' (399), or iron-spiked muzzle, is still sometimes used for calves, but is cruel to the cow. A plain muzzle, tight enough to prevent sucking, is more usual now. The 'molle capistrum' of 188 was, according to Conington, made of osiers.

Goats'-milk cheese (403) is familiar now under the name of 'Camembert.'

Dogs (404) have already been mentioned in 44 (Taygetique canes) and 345 and 371.[2] 'Spartan' is evidently the stock epithet for a good dog, just as bees are 'Hyblaean,' quivers 'Cretan,' lions 'Carthaginian,' and tigers 'Armenian.' Molossians were, according to Aristotle,[3] remarkable for size and courage, and therefore valuable to protect sheep from wild beasts. Somervile in his Preface to *The Chace* translates line 405:

> 'The greyhound swift and mastiff's furious breed.'

'Sero pingui' is usually understood to be whey, but Somervile thinks it is buttermilk. Dogs like both. A pointer in Colonel Peter Hawker's *Diary* so distended herself with the latter as to be quite unfit for work. According to Dioscorides (ii. 80) the whey from cheese is very nourishing for dogs. Columella

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never drinks.' References to watering sheep are frequent in the Old Testament (*cf.* Ps. xxiii. 2).

[1] *H. A.*, viii. 10. [2] Appendix B, § 6. [3] *H. A.* ix. 1.

(vii. 12) prescribes the addition of barley-meal. Several of the commentators quote Hesiod: *μὴ φείδεο σίτου κ.τ.λ.* Possibly 'pingui' implies that barley or some kind of meal was added to the whey, which is not fattening by itself. Heyne refers to Nemesianus and Gratius for the same precept. It is well known that dogs will thrive on food of this kind, although their natural diet is flesh and bones.

About a century ago Mr. Hugo Meynell matched two of his hounds against two of Mr. Barry's over a four-mile course. Meynell's were trained on legs of mutton, and Barry's mainly on oatmeal. The latter won, covering the course in eight and a quarter minutes.

Somervile in his Preface gives a very spirited rendering of 42-45:

> 'Hark away,
> Cast far behind the lingering cares of life.
> Cithaeron calls aloud, and in full cry
> Thy hounds, Taygetus. Epidaurus trains
> For us the gen'rous steed; the hunter's shouts,
> And cheering cries, the assenting woods return.'

Shakespeare's hounds of Theseus are magnificent (*A Midsummer-Night's Dream*, iv. 1):

> *The.* 'We will, fair queen, up to the mountain's top,
> And mark the musical confusion
> Of hounds, and echo in conjunction.
> *Hipp.* I was with Hercules and Cadmus once,
> When in a wood of Crete they bay'd the bear
> With hounds of Sparta: never did I hear
> Such gallant chiding; for, besides the groves,

The skies, the fountains, every region near
Seem'd all one mutual cry: I never heard
So musical a discord, such sweet thunder.
The. My hounds are bred out of the Spartan kind,' etc.

It must be admitted that Virgil has not come near this passage. Nor has Somervile in all his four books.

The five lines on hunting which follow (409-413) are Virgil's chief allusion to the subject.[1] The winter-hunting described above (371) has a parallel in *Georgic* i. 308. He has also touched on the subject in i. 140, and in the rousing appeal of horse and hound in 44 of this book.

From these and sundry passages in the *Aeneid* it appears that Virgil was a sportsman at heart. From the humanitarian point of view this is a serious blot on the work of so gentle and religious a poet. But, in spite of all that humanitarians may say, there have never been wanting men of the highest character who have found it possible to combine hunting, shooting, or fishing with a genuine love of the quarry and its natural history. There is no sign that Virgil regarded hunting merely as a training for war, or, with Pliny, merely as a mental relaxation. But it must be admitted that ancient sport was not of a high order, and much resembled the methods of the poacher.

The stag was driven into a net, with the aid of a 'formido' or cord with red feathers on it.[2] The hounds were only used as the 'tufters' of the Devon and Somerset, and the deer-hounds of Scotland.

[1] Appendix B, § 7. [2] Appendix B, § 8.

Prolonged hunting by scent was not practised. The business of the 'tufters' is simply to find the stag and start him. Oppian calls them ἰχνευτῆρες.

The knife (374) is still used when the stag is brought to bay, and the 'formido' may now be seen acting the part of a deer-scare in Devonshire, where the deer are a serious nuisance to the farmer.

The 'ingens cervus' (413) was probably valued for his head as well as his bulk (*cf. Aeneid* vii. 483 for a 'warrantable' stag; and *Eclogue* vii. 30).

The wild ass (409) is apparently mentioned for literary reasons.[1] It has never been a native of Europe, but is a favourite quarry of Arab hunters, and is mentioned in Job xxxix. as a type of speed and wildness. Swine are proverbially fond of wallowing (411) (*cf.* 2 Peter ii. 22). Varro[2] describes it as 'illorum requies, ut lavatio hominis.' It is cooling in hot weather, and keeps the flies off. Buffaloes also love it.[3]

The first word of line 440 gives the heading for the remainder of the book, the greater part of which is concerned with some great cattle-plague. The special remedies prescribed are mostly obsolete, and the 'causas' in 441-444 are an error, as might have been expected. Scab is really due not to cold or wet (*cf.* 299) or wounds, but to an acarian parasite, the *Dermatodectes ovis*. Columella repeats Virgil's error, and no commentator seems to have exposed it. Scab is very contagious, but can be

[1] But the Romans were fond of its flesh (Pliny, viii. 170).

[2] *R. R.* ii. 4.

[3] Appendix B, § 9.

prevented and cured by sheep-dip, the use of which is now compulsory in England.

Oil,[1] sulphur, tar, and hellebore are still used, sulphur and hellebore both being good for skin diseases. Oil is used in mixtures; and in Scotland it serves as a protective against cold and wet, as also in Palestine.

Scab does not produce an ulcer, and ulcers do not need lancing (453). But 'ulcus' may simply mean a sore place, and it is possible that 'scabies' is meant to include skin ailments other than what is technically known as scab. Mr. Mackail avoids committing Virgil to either.

The Song of our Syrian Guest, an exposition of Psalm xxiii., contains the following passages: 'The psalm closes with the last scene of the day. . . . The shepherd has the horn filled with olive-oil, and he has cedar-tar, and he anoints a knee bruised on the rocks, or a side scratched by thorns. And here comes one that is not bruised, but is simply worn and exhausted; he bathes its face and head with the refreshing olive oil, and he takes the large two-handled cup and dips it brimming full from the vessel of water provided for that purpose, and he lets the weary sheep drink. . . . "He anointeth my head with oil, my cup runneth over."'

[1] Oil, sulphur, and tar are used for camels both as a dressing and as a medicine. The 'oil' in Ps. xxiii. 5 is probably a reference to its use for sheep. According to Eastern interpreters, the figure of the shepherd is maintained throughout the psalm. J. G. Wood says oil is applied to the forehead after shearing and lambing.

Thus oil, tar, and water all have their use for sheep.

Sheep-washing (445; *cf.* i. 272) in the *Georgics* seems to be entirely for health. With us it is merely to cleanse the wool before shearing.

In some respects it appears that veterinary science has not advanced since Virgil's day. He may well be excused for vagueness if the following be true: 'During the last ten or twelve years new forms of disease have appeared. A flock of healthy sheep in a week or ten days are in serious trouble; many die, and the remainder recover slowly with weakened systems. Post-mortems often disclose nothing. Sometimes it seems infectious, sometimes not. No cause is apparent, and no preventive measures possible. Shrewd old shepherds are baffled, experienced flockmasters are beyond their depth, and trained pathologists are as much in the dark as the youngest student.' The above is condensed from an article in *Country Life* of March 30, 1912.

Superstitious inactivity is a common phenomenon in the face of any mysterious pestilence (455-456). Lecky[1] has an allusion of a similar kind to the great English cattle-plague of 1865: 'When a deadly and mysterious disease fell on the cattle of England, some divines, not content with treating it as a judgment, proceeded to trace it to certain popular writings, containing what were deemed heterodox opinions about the Pentateuch, or about the eternity of punishment.' Disbelief in natural causation is

[1] *Hist. Eur. Morals*, i. p. 356.

apt to lead to idle fatalism, or prayer unaccompanied by effort, as Virgil knew.

The 'venam' of 460 is, properly speaking, an artery, and the translators must be corrected. Sheep are bled in the foot, or face, or ear; not in the neck, owing to the thickness of the wool, as Keightley points out. Bleeding used to be common for animals, as for man, but is rarely used now.

The 'signa' of disease (464-467) show that Virgil was a good observer here. Healthy sheep are close biters, as Conington's authority informed him. The meaning of 468 is obviously that the sheep is to be killed. Virgil is effecting a transition from scab to the 'multae pecudum pestes,' which he does not always trouble to distinguish from one another (471).

The account of the great plague which follows is doubtless influenced to some extent by Lucretius, and through him Thucydides.[1] But there is no reason to accuse Virgil of merely adapting the plague of Athens for his own purpose. He undoubtedly has some historical cattle-plague in his mind; and if his description is vague and inaccurate here and there, at least the delicacy of his feeling has saved him from some of the disgusting realism of Lucretius, who has sacrificed true poetry to medical science.

The great outbreak of rinderpest in 1865 is remembered by many people now living. Virgil's cattle-plague was evidently something of the same kind.

[1] Lucr., vi. 1138 to end; Thuc., ii. 47-54.

The last case in England occurred in 1877. It has existed in Egypt since 1910, having come through Uganda and the Soudan from the Transvaal.

Martyn gives a long account of a cattle-plague in 1714, when 5,418 bulls and cows were lost in Middlesex, Essex, and Surrey. But Virgil is really including all diseases of all animals under one name. Rabies in dogs (496), and lung disease in pigs, have nothing to do with cattle-plague. Pigs are peculiarly subject to lung diseases,[1] and pleuro-pneumonia used to be a great scourge among cattle. Horses (498) are not affected by rinderpest, but foot-and-mouth disease sometimes attacks horses and sheep, as well as cattle. Coldness of the ears (501) is a well-known bad symptom in horses.[2] The drenching-horn (509) is still used by old-fashioned practitioners, but a bottle is safer. Wine and beer are sometimes given to horses, especially racers, as a stimulant. The tearing of their own flesh (514) is no poetical embellishment, but a symptom of rabies, a rare disease in horses.[3] It is not unknown in bad cases of colic. Rabies in dogs has already been noticed (496). Somervile shows indebtedness to Virgil in his description of rabies in foxhounds

[1] 'Tussis anhela' (497) cannot refer to swine fever, which was reported from twenty-five counties in England and Wales in July, 1913.

[2] The same applies to the dry and hard skin (502). Both points are noticed by Keightley.

[3] A 1912 report from the Pasteur Institute of Sao Paulo in Brazil says rabies has destroyed nearly all the cattle and horses of a certain district there.

(*The Chace*, bk. iv.), and perhaps Collins[1] remembered him:

'There every herd by sad experience knows
How, winged with Fate, their elf-shot arrows fly,
When the sick ewe her summer food foregoes,
Or stretched on earth the heart-smit heifers lie.'

The beautiful passage which follows (515-530), well known to readers of Calverley, is a good instance of Virgil's power to raise his subject to the highest level. Sellar[2] has an interesting note on its accuracy: 'The truth of this picture is confirmed by a modern writer, who, in her idyllic stories from the rural life of France, seems from time to time, better than any modern poet, to reproduce the Virgilian feeling of Nature. . . . [A long descriptive passage follows.] . . . Le bouvier dira: "C'est une paire de bœufs perdue: son frère est mort, et celui-là ne travaillera plus. Il faudrait pouvoir l'engraisser pour l'abattre; mais il ne veut pas manger, et bientôt il sera mort de faim."'

The 'uri' of 532 are the 'silvestres uri' of iii. 374, the buffalo of Italy; not the 'uri' of Caesar (*B.G.*, vi. 28). These latter are the extinct aurochs, compared by Caesar to elephants, and probably identical with the רֵים or wild ox of Job xxxix. 9-12 (*cf.* Num. xxiii. 22 and Deut. xxxiii. 17):

'Canst thou bind the wild ox with his band in the furrow?
Or will he harrow the valleys after thee?'

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[1] W. Collins, *Ode on Superstitions of Highlands.*

[2] Sellar's *Virgil*, p. 250.

'Sed adsuescere ad homines et mansuefieri ne parvuli quidem excepti possunt.'[1] If Keightley had studied these passages, he would hardly have suggested that Virgil is here using 'urus' in its proper sense. There is no evidence that Caesar's 'uri' were ever domesticated; but the common buffalo is domesticated in Italy, India, Palestine, and Egypt. J. G. Wood says of it: 'Being much larger and stronger than the ordinary cattle, it is useful in drawing the plough, but its temper is too uncertain to render it a pleasant animal to manage.'[2] In Egypt the bulls are killed for veal, and only the cows used for agricultural purposes.

At 537 Virgil picks up the 'ferarum' of 480. The plague affects wild creatures, and has the same effect on deer as hunger in a hard winter (539). These ten lines obviously have no connection with a cattle-plague. But Virgil is right in attributing epidemic diseases to wild beasts and birds and even fish. Grouse disease and salmon disease are well known. Wood-pigeons a few years ago were dying of a kind of diphtheria. Trout have been decimated in some streams since the summer of 1911 by a mysterious disease producing blindness. Both salmon and trout have been dying in large numbers in the Usk, and the result is very much what Virgil depicts in 541-542.

The conclusion of the book (547-end) is a return to the cattle-plague, and a powerful piece of poetical description. It might have been written of the

[1] Caesar, vi. 28. [2] *Bible Animals*, p. 115.

plague of 1865, especially 556-560. Cattle were then buried in pits and burnt with lime.

It is characteristic of Virgil to end thus. Any return to the brighter side of things would have weakened the awfulness and pathos of the scene:

> 'subeunt morbi tristisque senectus
> Et labor et durae rapit inclementia mortis.'[1]

§ 2. The Ant, i. 186 and 380.

The 'inopi metuens formica senectae' of the first passage is Milton's—

> 'Parsimonious emmet, provident
> Of future, in small room large heart enclosed.'

There are two well-known passages in the Book of Proverbs, vi. 6-8 and xxx. 24, 25, which speak of the ant as 'providing her meat in the summer.' This is a truer commentary on Virgil than any of his commentators' notes, which either ignore the passage altogether or deny the truth of it. Conington alone has any hint of the facts, which he has obtained from Mr. Blackburn. Keightley dismisses it as 'all an error.' Even such distinguished authorities as Huber and Kirby and Spence have supported him. But Virgil has been amply vindicated.

Charles Darwin procured some interesting information from Dr. Lincecum, who studied ants in Texas for twelve years. It is reported in the *Journal of the Linnean Society*, vol. vi., no. 21:

'During protracted wet weather, it sometime

[1] *Georg.*, iii. 67.

happens that the provision stores become damp, and are liable to sprout and spoil. In this case, on the first fine day the ants bring out the damp and damaged grain, and expose it to the sun till it is dry, when they carry it back and pack away all the sound seeds, leaving those that had sprouted to waste. . . . There can be no doubt of the fact that [the grain-bearing grass] is intentionally planted. "Ant-rice" is produced by high cultivation, all weeds being cleared away.'

Light is thus incidentally shed on the second passage (i. 380). The 'ova' which the ant brings out are not eggs, but grain. Ants also bring out their larvæ to enjoy the warmth of the sun. Virgil is, of course, wrong in making this a sign of rain, but 'ova' may equally well be larvæ.

'Senectae' is rightly explained by Keightley in the light of *Aeneid* iv. 403, 'hiemis memores,' where the passage is completed by 'tectoque reponunt.' The confident errors of later naturalists with regard to European ants arose from their not having studied them in Mediterranean countries. Tristram[1] throws much interesting light on this point. Of 104 known species of European ants only three are known to lay up stores for the winter. But 'two of the most common species of the Holy Land (*Atta barbara* and *Atta structor*) are strictly seed-feeders, and in summer lay up large stores of grain for winter use. These species are spread along the whole of the Mediterranean coasts, but are unknown in more northern climates.'

[1] *Nat. Hist. of Bible*, pp. 320 and 496.

The Mishna legislates about the granaries of ants found in corn-fields, which shows that they must have been of considerable size.

Horace[1] has the same thought as Virgil:

> 'Parvula, nam exemplo est, magni formica laboris
> Ore trahit quodcunque potest atque addit acervo,
> Quem struit haud ignara ac non incauta futuri.'

Cf. Appendix B., § 14.

§ 3. Cicada, iii. 328.

This insect is the τέττιξ of the Athenians, celebrated in song, and worn, as a golden image, in their hair. Martyn describes it well, and adds that it has not been found on this side of the Alps and Cevennes. Keightley heard them in the trees in Lombardy, and Page says of them that 'at midday in summer the only things which seem alive in Italy are the cicadas.' Byron calls them—

> 'The shrill cicadas, people of the pine,
> Making their summer lives one ceaseless song.'

They are not 'locustae' or grasshoppers, and, according to Martyn, make a noise five times as loud. 'Rumpent arbusta' is very expressive; *cf.* Theocritus vii. 139: τέττιγες λαλαγεῦντες ἔχον πόνον.

Virgil mentions them also in the *Eclogues* ii. 13,[2] a passage which Gilbert White applies to the field cricket (*Gryllus campestris*) of England. Heading his letter[3] with 'resonant arbusta,' he says that 'in

[1] *Sat.*, i. 1, 32. [2] Also in v. 77. [3] *XLVI., to Barrington.*

hot weather, when they are most vigorous, they make the hills echo. . . . The shrilling of the field cricket, though sharp and stridulous, yet marvellously delights some hearers, filling their minds with a train of summer ideas of everything that is rural, verdurous, and joyous.'

The τέττιξ, or cicada, seems to have had much the same effect on the Greeks and Romans, as Anacreon's ode and many passages in other authors contribute to show.

§ 4. Mus, Talpa, and Curculio, i. 181-186.

As these three pests occur in the same context, it will be convenient to consider them together.

It would be natural to identify 'exiguus mus' with *Mus minutus* (the harvest mouse); but this species makes its nests in the open field at a height of six inches to a foot from the ground, suspended, like the reed warbler's, between the stems of grasses or corn. It is found in Northern Italy, but Virgil's 'exiguus mus' must be understood generically of the various other species which haunt granaries.

The mole is not merely not eyeless, but has the power of exposing the eyes at will.[1] It is certainly sensitive to light, but perhaps its eyes have no further use. Hence the ancients thought it entirely blind.

Holdsworth quaintly observes: 'This was the

[1] *Cf.* Sir H. Johnston, *British Mammals*, p. 60.

vulgar opinion. Galen knew otherwise, and the microscope has fully discovered it in our times.

'Curculio' (also 'Gurgulio') is the generic name of the *Curculionidae*, which are found almost all over the world. Two of the most destructive species are the corn weevils, *Calandra granaria* (or *Sitophilus granarius*) and *Calandra oryzae*. Each larva enters a single grain and devours it. Holdsworth compares the 'Gourgillon' and 'Calendre' of the French. J. G. Wood[1] records a case where ten hundredweight of weevils were sifted from seventy-four tons of Spanish wheat.

The construction of Virgil's threshing-floor was probably very effectual in keeping out pests, for it was tested by Assheton Smith,[2] the great foxhunter, for his kennels, and 'the hounds were strangers to shoulder-lameness ever afterwards,' all the yards being laid with hard clay or chalk, which excluded damp completely.

[1] *Insects at Home*, p. 185. [2] *Life*, ch. iv.

PART II

BIRDS

§ 1. ANSER, i. 119.

KEIGHTLEY sees no reason to suppose that this is the wild goose. 'Surely,' he says, 'no one ever saw wild geese in a cornfield.' As a matter of fact, wild geese are not only frequently seen in cornfields, but are shot there from behind the hedges, when the moon gives sufficient light; for they are night feeders and very wary. It is true that domestic geese injure pasture by eating the best parts and drawing it up by the roots, but Virgil can hardly be speaking of pasture here (*cf.* 119 'versando terram'). Holdsworth observes that 'geese are still very pernicious to the corn in the Campania Felice—the country which Virgil had chiefly in his eye, when he was writing his *Georgics*.'[1]

[1] The commonest species of wild goose in Italy is, according to Dresser (*Birds of Europe*), the bean goose, aptly named

The goose is called *improbus*, like the cornix in iii. 338 or the snake in iii. 431. The same word is applied to the wolf in *Aeneid* ix. 62, and to the eagle in *Aeneid* xii. 250, and also to inanimate or abstract things, such as 'mons' and 'labor.' The translators have 'greedy,' 'glutton,' 'villain,' 'reprobate,' 'wicked,' and 'tiresome.' Conington calls the goose 'unconscionable, regardless of its own and the farmer's dues.' If we compare the 'shameless' stone[1] of Sisyphus, we have all the meanings of 'improbus' that are connoted here, and there is a species of goose for every one of them.

§ 2. Grus, i. 120, 307, 375.

The Strymonian crane (i. 120) is one of the farmer's pests. This is fully borne out by naturalists. Bowdler Sharpe says it eats all sorts of corn, seeds, buckwheat, and peas. Buffon says corn is its favourite food, and mentions one that was found full of beans, and another of clover.

In i. 207 it appears to be game rather than vermin. In Horace's banquet (*Sat.* ii. 8. 87) there are 'membra gruis sparsi sale multo, non sine farre,' as a special delicacy. Mr. Warde Fowler quotes Pliny on the subject. The crane formerly bred in England, and was much esteemed as a table bird, as Yarrell shows.

In i. 375 Sidgwick takes 'aeriae' predicatively, and

Anser segetum, for it eats young wheat as well as grain. Wild duck have the same fondness for corn, and their flesh is said to be much improved by their depredations.

[1] *Odyssey*, xi. 598.

Mackail translates : 'either as it gathers in the valley bottoms the crane soars high in flight before it ; or,' etc. The other translators, except Dryden, follow Heyne, Wagner, Martyn, Keightley, Conington and Page, in taking 'vallibus imis' with 'fugere' as a locative ablative. There can be no reasonable doubt that the majority are right. 'Grues, cum imber ingruit, petunt valles; quare iunge *vallibus fugere*' (Wagner).

Virgil is thinking of 'such a storm as descends in autumn from the Alps upon the plains of Lombardy.' So Mr. Warde Fowler introduces the passage, but he has an unfortunate misprint in his quotation from Rhoades. The 'high-soaring cranes flee to the vales,' not 'to the hills.' This agrees with Aristotle :[1] his cranes take observations from aloft, and if they see a storm coming seek cover.

§ 3. 'CANDIDA . . . AVIS LONGIS INVISA COLUBRÏS, ii. 320.

This is by common consent *Ciconia alba*, the white stork. It is a migrant in Mediterranean countries, and not common anywhere now, except in Spain, where it breeds freely. It is a most useful bird, feeding chiefly on snakes and other reptiles; and, unlike the crane, it is a friend to the farmer.[2] 'Doubtless the bird arrived in great numbers in spring on the Mantuan marches, and found abundance of food there in the way of frogs and snakes. Its

[1] *H. A.*, ix. 10. [2] Warde Fowler, *op. cit.*, p. 229.

snake-eating propensity was considered so valuable in Thessaly, that the bird was preserved there by law, says Aristotle.'[1] Pliny (x. 31) has some interesting remarks: 'Ciconiae quonam e loco veniant, aut quo se referant, incompertum adhuc est. E longinquo venire non dubium, eodem quo grues modo: illas hiemis, has aestatis advenas. Honos iis serpentium exitio tantus, ut in Thessalia capitale fuerit occidisse, eademque legibus poena, quae in homicidam.'

Cf. 'Serpente ciconia pullos
Nutrit et inventa per devia rura lacerta.'
(Juvenal, xiv. 74.)

The migration of the stork is cited as an example of punctual obedience in Jeremiah viii. 7, and if the translation be right three other of Virgil's birds share the same honour: 'Yea, the stork in the heaven knoweth her appointed times; and the turtle and the swallow[2] and the crane[3] observe the time of their coming; but my people know not the ordinance of the Lord.'

§ 4. MERGUS AND FULICA, i. 361-363.

The identification of these two birds is beset with difficulty, as Conington's note shows. There is general agreement that 'Mergus' is some species or all species of gull, though the name is more suggestive of a cormorant or diver. Modern ornithologists apply *Larus* to the gull, and *Mergus* to the Merganser and kindred species. It is therefore not surprising that Martyn translates it by 'cormorant' and Voss by 'diver.' But Virgil's Mergus does

[1] *Mirabilia*, 23. [2] Or 'swift.' [3] Or 'swallow.'

exactly what gulls are observed to do now. In stormy weather they may be seen in the Midlands of England feeding among rooks in the fields. Here, in Cheshire, we see them every day. Their great powers of wing enable them to travel long distances overland till better weather recalls them to their natural home.

This does not apply to the cormorant, which is a short-winged heavy bird, like the ducks and divers. The question is whether 'Fulica' is the cormorant. Mr. Warde Fowler gives it up, and Page discreetly ignores both Mergus and Fulica. Martyn, Blackmore, and Mackail translate it 'sea-coot,' which, as Mr. Fowler puts it, is 'correct but meaningless.' Papillon and Haigh say '"shags" or "coots,"' apparently under the impression that they are the same bird. Fulica is usually understood to be the coot (*fulica atra*), and coots frequent the sea in large flocks—*e.g.*, in Poole harbour, especially in winter. But coots certainly prefer fresh water, and are seldom seen on land at all. Fulica (*cf.* Fulix and Fuligula) means a bird of dingy colour, and is the French 'foulque.'[1] In Southern France the coot is called 'macreuse,' which in Northern France is applied to the scoter. Moreover, North American wildfowlers call scoters coots. The scoter (*Oedemia nigra*), with the surf scoter and velvet scoter, is a real sea-duck, and deserves the epithet 'marina.' The chief objection is that 'of all ducks the scoter has perhaps the most marine habits, keeping the sea

[1] Newton, *Dict. of Birds.*

in all weathers, and rarely resorting to land.'[1] Virgil might well have used the same name for coot and scoter, but probably his 'fulica marina' is neither.

In spite of the witty version of 'in sicco,' etc.—'Loons disport themselves on dry matters'—grebes must be ruled out on account of their colour. On the whole, 'cormorant' seems the best translation of Fulica. Keightley thinks it is the 'shag or cormorant,' apparently identifying the two. The error is small, for the shag is the green cormorant, a smaller species of the same. Pliny supports this view by saying that the Fulica has a crest. The cormorant, though thoroughly amphibious, has a habit of sitting in groups on a rock and hanging out its wings to dry. It may be to this that Virgil is alluding. To anyone unfamiliar with it the sight of the upright forms of these birds, with their wings spread out but motionless, is very curious.

Professor Newton derives 'cormorant' from 'corvus marinus.' It is remarkable that the French is 'cor marin' and the Italian 'corvo marino.' No one with Virgil's powers of observation would have confused a cormorant with a coot; but it is quite possible that the same name did duty for both with different people, just as in some parts of this country a great tit is called a blackcap, and a yellowhammer a goldfinch. Yarrell[2] observes that in Ireland and Wales and on the Scotch border the name of 'crane' is frequently applied to the heron, and sometimes to the cormorant and other long-necked birds.

[1] Newton, *Dict. of Birds.* [2] Vol. iii., p. 182.

§ 5. CORVUS AND CORNIX, i. 382, 388, 410.

The Corvus is mentioned in two passages that occur close together (*Georg.*, i. 382 and 410). It has given some trouble to commentators owing to the loose use of the name in other writers, and the fact that the crow and the rook are both rare in Italy. Lewis and Short's Dictionary translates it 'raven,' and gives no reference to Virgil. Martyn has 'raven' without comment. Dryden, with unpardonable folly, has 'rooks' in the first passage and 'ravens' in the second. Blackmore has 'crows,' possibly using it as a rustic synonym for 'rooks.' But whatever be the case with other writers, there can be little doubt that Virgil means the rook. In both passages his Corvus is gregarious, whereas the raven and the crow are not.

Moreover, Virgil was probably familiar with the sight of a rookery. Mr. Warde Fowler speaks of 'the delightful discovery that the rooks still stay and breed in the sub-Alpine neighbourhood where Virgil passed his early life.' Bosworth Smith[1] says that rooks still breed near Mantua, and nowhere else in Italy. Newton says: 'The district in which Virgil was born and educated is about the only part of Italy in which the rook breeds.' Bowdler Sharpe says it breeds locally in Northern Italy. A more recent writer, the Countess Cesaresco,[2] says that rooks are

[1] *Bird Life and Bird Lore*, pp. 373-374.

[2] *The Outdoor Life in the Greek and Roman Poets*, 1911, p. 130.

now found only in the pathless Maremne or the deserts of Southern Italy. Whatever be the exact truth, it seems to be established that the rook is an indigenous species in Italy, and may have been more abundant in Virgil's time.

Shelley heard rooks in Italy:

> 'Mid the mountains Euganean
> I stood listening to the pæan,
> With which the legioned rooks did hail
> The sun's uprise majestical.'
> (*Lines written among the Euganean hills.*)

Newton and Pennant have agreed that the rook is the Corvus of Virgil. Shelley's 'legioned rooks' are admirably depicted in 382, which may be illustrated by a passage from Richard Jefferies:[1]

'After the nesting-time is over and they have got back to their old habits—which during that period are quite reversed (*cf.* 410 *et seq.*)—it is a sight to see from hence the long black stream in the air steadily flowing onwards to the wood below. They stretch from here to the roosting-trees, fully a mile and a half—literally as the crow flies—and backwards in the opposite direction as far as the eye can see. It is safe to estimate that the aerial army's line of march extends over quite five miles in one unbroken corps.'

'Densis alis' may be a mistranslation of the πτέρα πυκνά[2] of Aratus, as Conington thinks, but more probably Virgil altered it, not merely 'to suit the *military* comparison' (Page), but because he knew

[1] *Wild Life in a Southern County*, ch. xv.

[2] 'Closely-feathered wings.'

that rooks' wings are not thickly feathered, and show the light between the quills when extended.

The other passage (410-414) is also true to nature. The 'liquidae voces' are always heard in spring. Mr. G. A. B. Dewar described it well in January, 1912, in the *Morning Post*:

'A few hours before writing this I heard a kind of falsetto cawk in the elm, looked up through the wretched drizzle, and saw two pairs of rooks wooing. . . . The male made a kind of obeisance to his partner, and as he did so his tail went up and opened like a fan. He raised his voice and it broke.'

Lines 415-423, to quote Sellar,[1] 'elevate the whole description into the higher air of imaginative contemplation.' They are entirely Virgil's own. They may be contrasted with iv. 219-227. Here he is recalling Lucretius v. 1078-1090. Though rooks are not usually regarded as weather prophets, they are social creatures, like the bees, and possess plenty of intelligence. A great Bishop[2] is recorded to have said of them: 'Depend upon it, the rook has a deep purpose in everything which he does.' Though Virgil contrasts them, by implication, with the bees, he certainly makes them, as Page points out, 'living and intelligent, which is all the *anima mundi* can do for them.'

The cornix (i. 388) is either the crow or the raven, or possibly both. Mr. Warde Fowler inclines to the

[1] Sellar's *Virgil*, p. 197.

[2] Westcott, *Bosworth Smith*, p. 384.

raven, 'seeing that, at the present day, it is much the commoner bird of the two in Italy.'

Of Lucretius v. 1084 Munro remarks: '*Cornices* or *Corvi* are clearly used here with poetical licence, and between them include the whole crow kind; *greges* would be singularly inappropriate to the primary sense of *corvi*.' But perhaps, after all, Lucretius meant the rook by 'corvorumque greges,' and used 'cornicum saecla vetusta' for its non-gregarious congeners. The carrion crow is very like a miniature raven, but the whole passage suits the raven, on the whole, best; and most translators rightly prefer 'raven' here. Bosworth Smith[1] devotes to this fascinating bird three chapters, in the course of which he writes: 'His walk is, like himself, stately and deliberate, especially when he is searching the seashore, . . . never so well described as in one line of Virgil, remarkable alike for its rhythm and its alliteration:

'And stalks in stately solitude along the dry sea-sand.'

Page aptly quotes Poe's 'Raven':

'In there stepped a stately raven from the saintly days of yore.'

Lucan (v. 556) has:

'Instabili gressu metitur litora cornix.'

§ 6. HALCYON OR ALCYON, i. 399 and iii. 338.

Most translators keep the name, but Mr. Mackail renders it 'kingfisher,' and there can be no doubt

[1] *Op. cit.*, p. 86.

that he is right. Mr. Warde Fowler supports this view, quoting Pliny's detailed description. It is Tennyson's 'sea-blue bird of March,' which he took from Alcman's ἁλιπόρφυρος εἶαρος ὄρνις.

But whether the Greek ἀλκύων is the kingfisher may be questioned. Tristram identifies it with a tern (*Ibis*, 1893, p. 215), and Mr. Warde Fowler agrees with him. Thompson (*Greek Birds*) identifies it with the swallow, as the bird of spring, and has no doubt that the halcyon legend had an astronomical origin. He quotes Suidas as saying that the Pleiades were called Ἀλκυόνες. In his note on Theocritus vii. 57, Kynaston concludes that 'we cannot ascertain what bird the halcyon was; it certainly was not the kingfisher.'

Virgil's alcyon is partly mythical. The real kingfisher utters only a single note, resembling the alarm note of the swallow, and certainly does not sing, as in iii. 338 it is supposed to do. The myth, perpetuated in some of our English poets, is, of course, nonsense.[1] But Virgil obviously had a real bird in his mind, as he had in the case of the 'acalanthis,' and that bird was our kingfisher (*Alcedo ispida*), which is a resident in Italy.

[1] 'Secure as when the Halcyon breeds, with these
He that was born to drown might cross the seas.'
Dryden, *Astraea Redux*, 236.

'The halcyons brood around the foamless isles.'
Shelley, *Epipsychidion*.

Cf. Appendix B, § 11.

§ 7. NOCTUA, i. 403.

'Noctua' is probably the γλαῦξ of Athens, the sacred originator of γλαῦκ' Ἀθήναζε[1] and of the γλαῦκες Λαυριωτικαί,[2] the little owl or *Athene noctua* of naturalists. Tristram[3] describes his habits in Palestine: 'In the tombs or on the ruins, among the desolate heaps which mark the sites of ancient Judah, on the sandy mounds of Beersheba, or on the spray-beaten fragments of Tyre, his low, wailing note is sure to be heard at sunset, and himself seen bowing and keeping time to his own music.'

Waterton, who obtained his specimens in Italy, was the first to introduce this bird as a resident English species in 1843. Since then several other attempts have been made, notably by Lord Lilford, with the result that in Northamptonshire at least the little owl has become a serious nuisance to the game-preserver. It hunts by day, and, as Virgil implies, does not wait till the sun has set before it begins to hoot; unlike the more familiar brown or tawny owl, whose soft musical voice is so frequently heard after dark. The white or barn owl, Bosworth Smith[4] observes, 'screeches, snaps, snorts, snores, squawks, hisses; but it is now, I think, established that he never hoots.'

What the precise meaning of line 403 is in this context it is not easy to determine. Heyne and Martyn quote Pliny (xviii. 87): 'Sic noctua in imbre

[1] A proverb equivalent to 'carrying coals to Newcastle.'

[2] Greek coins stamped with the figure of an owl.

[3] *Nat. Hist. of the Bible*, p. 195.

[4] *Op. cit.*, p. 16.

garrula, at sereno [praesagit] tempestatem.' Martyn has a lengthy and very unconvincing discussion, in which he decides that 'nequiquam' is equivalent to 'non.' Wagner is brief and to the point: '*Nequidq.* quasi quae cantu suo turbulentam tempestatem revocare velit.'

This is the meaning preferred by Keightley and Page. The ill-omened prophet of rain now calls unheeded.

But perhaps Virgil's meaning is simpler than they suppose. Aratus refers to the hooting of the owl as a sign of fair weather:

Καὶ νυκτερίη γλαὺξ
Ἥσυχον ἀείδουσα μαραινομένου χειμῶνος
Γινέσθω τοι σῆμα.

(Διοσημ, 267.)

This seems to satisfy Conington, who explains 'nequiquam' of 'prolonged objectless effort.' The word 'nequiquam' and the rhythm of the two lines are very suggestive of this solemn bird as he appears in poetry of a later date:

'The moping owl doth to the moon complain.'[1]

But the owl, like the nightingale, is probably a happy bird. Wordsworth in 'The Evening Walk' was led to change

'The tremulous sob of the complaining owl.'

into

'The sportive outcry of the mocking owl.'

Of course Gray and Wordsworth were writing of the brown or tawny owl, not of the little owl.

[1] Gray's *Elegy*.

Thomson[1] suggests that a spirit of sarcasm possessed the Greeks when they chose this 'veritable buffoon among birds' as a type of wisdom.

On the Continent the little owl is used as a decoy for small birds, which come to tease it, and are caught with birdlime. It ranges throughout Southern Europe, and is called 'la civetta' by the Italians, and 'la petite chouette,' or 'chouette chevêche' by the French.

The female measures $11\frac{1}{2}$ and the male $8\frac{1}{2}$ inches in length (Bowdler Sharpe). Dresser's measurements are 9 and 8·2 inches respectively.

§ 8. Nisus and Scylla, i. 404-409.

The story of Nisus and Scylla is evidently an ætiological myth. Virgil is describing what he had often seen, an eagle or falcon pursuing some smaller bird. Lines 406-409 are found also in the pseudo-Virgilian *Ciris*. Thompson[2] considers them out of place and keeping here, and finds an elaborate explanation of the story in a sun and moon myth. Both criticisms are quite unnecessary. The whole picture is beautifully true to nature. Nisus 'waits on,' as falcons do, at a great height till he sees his quarry. He 'stoops' 'magno stridore.' (The 'stoop' of the peregrine is audible at a considerable distance, from its marvellous speed.) Having missed his 'stoop,' he has to mount again for another one. Meanwhile the quarry makes the most of the interval. Some

[1] *Britain's Birds.* [2] *Greek Birds.*

birds are very clever at dodging the falcon; for instance, the lapwing or peewit has such powers of flight that no tame falcon can take her.

Both names are left untranslated by cautious scholars. Scylla cannot be identified with anything except the Ciris; which does not help us.

Nisus appears in Sidgwick's notes as an osprey, and in Blackmore as a kestrel. Neither can be supported. The osprey is exclusively a fish-hawk, and the kestrel preys chiefly on mice and insects, though here and there an individual of this species prefers young pheasants. Blackmore renders Scylla by 'lark'; and if he had chosen 'merlin' for Nisus, he would have done well. Trained merlins are still used for lark-hawking. As it happens, Nisus has been appropriated by naturalists for the sparrowhawk (*Accipiter nisus*), which is very fond of small birds.

But the picture is far more suggestive of one of the eagles or long-winged hawks. The Haliaëtus of the myth is, according to Lewis and Short, the 'osprey or sea-eagle.' They are, of course, entirely different species, though the name Haliaëtus is applied by naturalists to both. The osprey (*Pandion haliaëtus*) must be ruled out, for reasons given above. The white-tailed or sea-eagle (*Haliaëtus albicilla*)[1]

[1] Thomson (*Britain's Birds*) has an interesting observation on the white-headed or bald eagle of North America. This bird swoops at the osprey and forces him to drop the fish he has caught. 'Then, darting like a thunderbolt, head first, and with wings working to increase the awe-inspiring speed, the eagle overtakes the falling fish and sweeps off with it in an ascending curve.'

may stand as a translation of Nisus, but the name had better be taken as a generic term for the larger *falconidae*, especially those that habitually take their prey on the wing, striking it down with the powerful hind-claw.

§ 9. Acalanthis, iii. 338.

It is impossible to identify this bird with anything like certainty. The older commentators and translators make it a goldfinch or a linnet. Thompson (*Greek Birds*) thinks it is one or the other. But it is far more likely to be a warbler. Ἀκανθίς and ἀκαλανθίς appear to be synonymous. Ἀκανθυλλίς, according to Liddell and Scott, is the 'pendulous titmouse,' which might mean any titmouse.

The Scholia on Theocritus vii. 141 make ἀκανθίς synonymous with ἀκανθυλλίς and ποικιλίς. Aristotle[1] describes the nest of the ἀκανθυλλίς as 'woven like a ball of flax, with a small entrance.' Four chapters farther on he says of the ἀκανθίς that it is a bird of mean habits and colour, but shrill voice. It is not likely that he is describing the same bird under two names, but both these passages point to the three warblers which puzzled Gilbert White, the willow wren, wood wren, and chiffchaff.[2] Mr. Warde Fowler has a very interesting discussion. In a note

[1] *H. A.* ix. 13 and 17.

[2] The wood wren is the largest and the chiffchaff the smallest of the three. They are very difficult to distinguish at sight, but the songs are unmistakable.

on p. 246 of his book he refers to the epigram of Agathias in the Greek Anthology: *καὶ λιγυρὸν βομβεῦσιν ἀκανθίδες*—'a sibilant trill is probably what is meant . . . suggesting the grasshopper-warbler or the sedge-warbler.' It is strange that he does not mention the wood-warbler (or wren),[1] the bird that Gilbert White[2] heard making a 'sibilant shivering noise in the tops of tall woods.' The sedge-warbler's song is hardly a sibilant trill, and of the grasshopper-warbler he himself writes: 'Our bird's noise—we can hardly call it a voice—is like that of a well-oiled fisherman's reel.'[3] This is an excellent simile.

According to Servius, some people identified Virgil's bird with the nightingale, 'alii lusciniam esse volunt.' But Virgil mentions the nightingale by name elsewhere, and evidently knew him well (*Georg.*, iv. 511). There is one more bird that may be worth suggesting—namely, the blackcap. Virgil must have had a typical songster in his mind, and many observers agree with Gilbert White in ranking the blackcap second only to the nightingale as a singer. The blackcap is found in Southern Europe, and very likely Virgil had often heard the peculiarly sweet and varied tones of that warbler.

The translation 'warbler' (Mackail) is lamentably weak, but must be admitted as the most accurate that knowledge allows. Mr. Warde Fowler has made out an excellent case for the *Phylloscopi*, and

[1] Which he treats in ch. v. [2] *Letter X., to Pennant.*
[3] *Op. cit.*, p. 157.

we cannot safely go further from a scientific standpoint: 'In Italy and Greece the number of species of these little birds is much larger than in England, and it is hardly possible that they could have escaped the notice of either poet or naturalist. It is with these that I think we are to identify the *acanthis* and *acanthyllis* of Aristotle, the *acanthis* of Theocritus, and the *acalanthis* of Virgil.'

It is curious that the name ἀκανθυλλίς is now applied to the rare needle-tailed swift (*Acanthyllis caudacuta*), an Asiatic species which is said to have occurred only twice in Great Britain and nowhere else in Europe. A specimen was obtained at Ringwood, in Hampshire, in the summer of 1911.

§ 10. HIRUNDO, i. 377; iv. 15, 307.

Of the first of these passages Conington writes: '"Arguta," not a perpetual epithet, but denoting that she twitters as she flies.' As a matter of fact she does not, unless the alarm-note can be called twittering. Sidgwick explains it 'of the sharp twitter of the excited swallow.' The song or warble of the swallow is uttered from a perch, but the note used on the wing is a shrill double pipe, for which the epithet 'arguta' is very suitable. There is no connection between it and damp weather or flying round a pool; hence it probably is a perpetual epithet, like the 'garrula' of iv. 307. Swallows fly low before rain, as everyone knows, because the insects fly low when the atmosphere is

moist. Aratus[1] has a pretty touch which Virgil has omitted:

> Ἦ λίμνην περὶ δηθὰ χελιδόνες ἀϊσσονται,
> Γαστέρι τύπτουσαι αὖτως εἰλυμένον ὕδωρ.

Mackail rightly translates, 'the shrill swallow.'

The 'Procne' of iv. 15 is discussed under the heading of 'Bees.' 'Manibus signata cruentis' is doubtless a mythological explanation of the common swallow's red throat. There is another closely-allied species found in Southern Europe called the 'chestnut-bellied swallow' (*Hirundo savignii*), which has all the under-parts of a reddish colour; but, according to Dresser,[2] it is not common, and there is no need to suppose that any but the common species was in Virgil's mind here.

The Hirundo of iv. 307 is undoubtedly the house-martin, as Mr. Warde Fowler points out. Not one of the commentators or translators seems to be aware of this, except Conington's editors, who have copied Mr. Fowler. The question is settled by 'suspendit.' The swallow does not, as a rule, hang her nest, but builds it *upon* a beam or brick or some such support,[3] and leaves it open at the top. The martin builds it *against* a wall, whether of brick, wood, or rock, and roofs it in. 'Garrula' is an excellent word for the 'prattling' of martins in the nest, a sound which may be heard long after sunset.

'Hirundo' doubtless includes all the swallow tribe.

[1] Διοσημ, 212. *Cf.* Appendix B, § 10.

[2] *Birds of Europe.*

[3] Exceptions to this are numerous, but the nest is never domed.

It is used as their generic name now. To many Englishmen, and still more Englishwomen, 'swallow' means anything from a swift to a sand-martin; but they are easily distinguished, especially in their nesting operations, and it is not likely that Virgil did not know the difference between them. Modern ornithologists have decided that the swift is not a true Hirundo.

There is a beautiful description of a swallow in *Aeneid* xii. 473-477. Mr. Warde Fowler[1] writes of it: 'This simile is, I think, the most perfect passage about the swallow that I have ever met with in poetry.'

§ 11. Philomela, iv. 511.

This is the only passage in which Virgil mentions the nightingale. Though slightly less true to Nature than Homer's (*Odyssey* xix. 518), it is a singularly beautiful one. In England the nightingale does not sing after the young are hatched.[2] This objection has been triumphantly refuted by the Countess Cesaresco in her recent book.[3] It is not true, she tells us, of Italy. Take the train to Mantua in June, and nightingales 'drown the noise of the engine.'

Mr. Warde Fowler (*Classical Review*, February, 1890) thought Virgil was wrong in making the bird sing under the thin poplar shade instead of in

[1] *Op. cit.*, p. 249.

[2] *Cf.* Shakespeare's *Sonnet CII.*

[3] *Outdoor Life in the Greek and Roman Poets*, p. 129. *Cf.* Appendix A, § 2.

a thick bush, till one day at Godstow he was 'rebuked and delighted' by finding a nightingale doing precisely what Virgil describes.

It is, of course, the male bird that sings,[1] and the song is not inspired by sorrow. Milton[2] came under the lash of Coleridge for his:

> '"Most musical, most melancholy" bird.'

But he sang more truly in another passage[3] of

> 'The wakeful nightingale:
> She all night long her am'rous descant sung."

It was a spirit of religious mysticism, as Coleridge[4] points out, that

> 'First named these notes a melancholy strain,
> And many a poet echoes the conceit.'
>
> '. . . 'Tis the merry nightingale
> That crowds and hurries and precipitates
> With thick, fast warble his delicious notes,
> As he were fearful that an April night
> Would be too short for him to utter forth
> His love-chant, and disburthen his full soul
> Of all its music!'

Mr. Mackail alludes to Homer's passage as 'these miraculous lines in the *Odyssey*.' I give his beautiful version of them:

> 'Even as when the maid of Pandarus,
> The greenwood nightingale melodious,
> Amid the thickened leafage sits and sings
> When the young spring is waxing over us;

---

[1] Phaedrus and Seneca have *luscinius*.

[2] *Il Penseroso*. [3] *P. L.* iv. 603; *cf.* v. 41.

[4] *The Nightingale*.

> And she with many a note and hurrying trill
> Pours forth her liquid voice, lamenting still
> Her own son Itylus, King Zethus' child,
> Whom long ago her folly made her kill.'

Coleridge's 'merry nightingale' is found in an anonymous poem, formerly attributed to Chaucer, *The Flower and the Leaf:*

> 'The nightingale with so mery a note
> Answered him, that all the woode rang.'

Finally, it is a pleasure to be able to quote the new Laureate[1] at his best in *Nightingales:*

> 'Alone, aloud in the raptured ear of men
> We pour our dark nocturnal secret; and then,
> As night is withdrawn,
> From these sweet-springing meads and bursting boughs of May,
> Dream, while the innumerable choir of day
> Welcome the dawn.'

§ 12. Merops, Cycnus, Ardea.

Three other species are mentioned in the *Georgics*. The bee-eater (iv. 14) is noticed under the heading of Bees, and there is nothing to add to what the standard ornithological works say of it.

The swan (ii. 199) 'is without any doubt the whooper (*Cycnus musicus*), whose voice and presence are still well known in Italy and Greece.'[2]

[1] Robert Bridges, *Shorter Poems*, bk. V. xii.

[2] Warde Fowler, *op. cit.*, p. 238. The *Aeneid* contains two fine passages about this bird: vii. 699-705 and xi. 456-458.

The heron (i. 364), in contrast to the crane, is described as soaring above the clouds to avoid a storm. It is difficult to believe that Virgil had ever seen it doing so, unless he had stood on some Alpine peak which took him above the clouds. He differs here from Aratus, as Keightley points out. But Lucan has the same observation in the same kind of context (v. 553):

'Quodque ausa volare
Ardea sublimis pennae confisa natanti.'

'The ancient poets,' as Keightley says, 'were not very solicitous about accuracy in these matters.'

PART III

BEES

'IF the question were asked, "What book should first be placed in the hands of the beginner in apiculture to-day?" no wiser choice than this fourth book of the *Georgics* could be made; for Virgil goes direct to the great heart of the matter, which is the same to-day as it was 2,000 years ago. The bee-keeper must be first of all a bee-lover, or he will never succeed; and Virgil's love for his bees shines through his book from beginning to end.'

Thus writes a modern expert, Mr. Tickner Edwardes. To Maeterlinck Virgil is the only one of the Greek and Roman bee-keepers worth studying. He condenses all that may be learned, and it is not much, from older writers. Many of their superstitions also survive in him, the first line of the book containing a typical example. The ancients thought that honey was gathered from honey-dew, which is really a secretion of aphides.[1] Bees will eat it greedily when nectar is scarce, and a very little spoils the taste and colour of the best honey.

[1] Digges, however, says it is sometimes exuded direct from leaves.

Aristotle allows that wax is gathered from flowers,[1] but traces honey to the same source as Virgil: γίγνεται κήριον μὲν ἐξ ἀνθῶν . . . μέλι δὲ τὸ πίπτον ἐκ τοῦ ἀέρος.[2] Apparently it was believed that honey-dew fell from the skies on to the leaves of trees. Virgil alludes to it in *Georgic* i. 131 ('mellaque decussit foliis'), and in *Eclogue* iv. 30 ('Et durae quercus sudabunt roscida mella').

Pliny speculates about it at considerable length. Even Gilbert White[3] is in error, explaining it as the evaporated effluvia of flowers, which are drawn up in hot weather, and fall again at night. He notes that it is 'very grateful' to bees.

The first five lines of *Georgic* iv. remind us of Michelet's[4] dictum that 'the bee-hive is the veritable Athens of the insect world.' Origen,[5] the great Greek theologian, has preserved a good comment: 'Bees have a leader, with a train of courtiers and servants, and wars and victories and captures of the vanquished, and cities and suburbs (προπόλεις), and relays of workmen, and lawsuits against the idle and vicious.'

Lines 8-35 contain practical precepts of the highest excellence. Many of Virgil's directions are still golden rules for every bee-keeper. It is quite true that 'pabula venti ferre domum prohibent' (9).

[1] Shakespeare has the same mistake (2 *Henry* iv. 4-5):

'Our thighs pack'd with wax, our mouths with honey.'

Even Buffon mistook pollen for wax.

[2] *H. A.* v. 22-4.

[3] *Letter LXIV., to Barrington.*

[4] *The Insect,* bk. III., c. viii.

[5] *Origen contra Celsum,* iv.

A heavy-laden bee may be blown into the grass below the hive and be unable to rise, especially if the wind be cold. Bees are also easily drowned (*cf.* 29), but water is needed for making honey, and for feeding the young bees, who die if they get no water. Hence water-carrying is part of the regular business of the hive. The 'flumina libant' of line 54 is not true, for bees do not drink on the wing; but bee-gardens usually have some regular watering-place, where bees may be seen drinking in thousands in the early morning or late afternoon. If the stream or pool which Virgil prescribes be absent, modern bee-keepers use some such device as a jar of water inverted on a saucer. The Isle of Wight bees are said to be fond of sea-water.

Shade (20) is useful in hot weather, and also in winter, for too much sun in winter will lure the bees out to die of cold.

The 'picti lacerti' (13) are the green lizards of Italy. The bee-eater (*Merops apiaster*)[1] is a rare visitor to England, but a well-known spring migrant in Southern Europe. The swallow tribe do little harm, only catching bees occasionally. In the well-known line,[2] 'The swallow stopt as he hunted the fly,' Tennyson originally wrote 'bee,' but altered it later.[3] Webster says he has seen the bees drive swallows away. But the swallow is not guiltless. Chaucer[4] calls

[1] In modern Greek the *μέροψ* is called the *μελισσοφάγος* or *μελισσουργός*. Aristotle mentions the *αἰγίθαλλος* (titmouse), *χελιδών*, and *μέροψ* among the enemies of bees.

[2] *The Poet's Song.* [3] Appendix A, § 3. [4] *P. of Fowles*, 353.

her 'the swalow, mordrer of the beës small.' Aelian[1] has an interesting note: 'Bee-keepers might readily have killed the swallow, but do not do so, for they reverence her song: they are content to prevent her from building her nest near the hives.'

Among the 'aliae volucres' may be mentioned the woodpecker, the sparrow, the robin, the red-backed shrike, and at least two kinds of titmouse. Ducks and fowls will also eat bees if allowed. May, Addison, and Trapp translate 'meropes' 'woodpeckers,' and Dryden has 'the titmouse and the pecker's hungry brood.' This is bad translating, but good natural history. The green woodpecker (*Gecinus viridis*) is common in Italy. The great and blue tits have a habit of tapping on the entrance-board of the hive in frosty weather, and snapping up the bees as they come to see what is the matter. This can be prevented, but the capture of a queen-bee on her nuptial flight is a contingency against which no bee-keeper can provide.

The 'reges' of line 21 raises a question which was not settled till the sixteenth century. Among the ancients the queen-bee was universally supposed to be a male. Xenophon,[2] however, in one passage speaks of ἡ ἐν τῷ σμήνει ἡγεμών μέλιττα. Writers of the sixteenth and seventeenth centuries describe her variously as a king or queen, but only in the sense of ruler of the hive. The word chosen depended largely, according to Tickner Edwardes,[3] on the sex

[1] i. 58. [2] *Oecon.* vii. 17.
[3] *Lore of the Honey-Bee*, ch. iii.

of the reigning sovereign of the country. 'Thus Rusden very wisely discarded the notion of a queen-bee when he had to deal with Charles II. Butler, perhaps the most learned of the mediæval writers on the honey-bee, as astutely forebore to mention the word king, his book being published in the reign of Queen Anne. He calls it *The Feminine Monarchie*, but seems to have no more suspected the truth that the large bee was really the mother of the whole colony than any of his predecessors.' The sex was discovered by Swammerdam, the great Dutch naturalist (1637-1680). He also discovered that the queen does not lead or govern, but is simply the mother of the colony. The Germans wisely call her the *Mutterbiene*.

Modern beemen are not proud of the 'prima examina . . . vere suo' (21). Indeed, their great object is to prevent natural swarming, and to bring it about artificially as needed. The old adage, 'a swarm in May is worth a load of hay,' is quite out of date.

The context suggests that 'ludetque favis,' etc. (22), refers to the buzzing cloud of bees before the swarm settles; but drones and young workers employed at home take daily air and exercise.

Virgil's hives are of two kinds. 'Corticibus' (33) means not simply bark, but the bark of the cork-tree, as we learn from Columella.[1] Cork hives, either natural or artificial, are mentioned also in *Georgic* ii. 453. Those of woven osiers are probably the

[1] ix. 6.

ancestors of our straw 'skeps,' discarded now as permanent hives by all up-to-date apiarists. The natural home of the bee is described in line 44. 'Effossis latebris' (42) is an error. The honey-bee does not excavate for herself.[1] Her natural home is a hollow tree; but in Palestine the wild bees hive in precipitous rocks. In South Africa they sometimes use an old ant-bear's or porcupine's earth, and in India combs are hung from the branch of a tree. The domestic bees of Palestine are kept in wicker or earthenware cylinders plastered with cowdung, and stopped at each end with it, except for a few holes. Earthenware cylinders are used in Cyprus, and in Africa hollow logs hung in thorn-trees. Rock bees are mentioned again by Virgil in *Aeneid* xii. 587, and by Homer in *Iliad* ii. 87.

The 'angustos aditus' (35) can be adjusted in modern hives to suit the season, but even in the height of summer they must not be large. Not only must enemies be excluded as far as is possible, but also the bees must to some extent be allowed to regulate the temperature themselves. If the officious bee-master pierce air-holes in the walls of the hive, the bees will spend the night in stopping them up again, as Virgil indicates. Ventilation is done through the entrance by the fanning bees, which fan the spent air out and the fresh air in with their wings[2] The current of air thus created by a populous hive is strong enough on a warm night to extinguish the flame of a candle.

Temperature is altered at will from about 80° to

[1] Appendix B, § 12. [2] Appendix A, § 4.

95° F. The latter is only needed for the secretion of wax. But wax is not used for plastering 'spiramenta.' Virgil is more accurate when he speaks of 'fucus' being used for this purpose. 'Floribus,' however, is out of place. 'Fucus' obviously means propolis, a resinous substance gathered chiefly from poplars, chestnuts, and pines. It is very tenacious and dries hard. Bees carry it, like pollen, on their hind-legs, and will use it for all repairs other than comb-building, and to cover over slugs or any refuse too heavy to be removed from the hive.[1]

It is true that honey is affected to some extent by heat and cold. Honey candies or crystallizes with cold, but this is a proof of its purity, and it can be melted, if desired, with hot water (*cf.* 36). Honey that is adulterated with glucose will not crystallize. Combs will stand a very high temperature, but in the hot summer of 1911 could hardly be handled safely, and the honey was apt to run from them.[2]

Yew-trees (47) are also mentioned in *Eclogue* ix. 30 as injurious to bees. This is a doubtful question. Burnt crabs, a primitive remedy for burns and scalds, according to Martyn, and a medical manure for certain trees, would be offensive to bees for the same reason as the 'palus' and the 'caenum.' Bees are clean creatures and dislike strong smells.

[1] The South African native uses it for fixing the iron spike of his assegai into his shaft.

[2] The heat of this wonderful summer is said to have played havoc in hives not protected from the sun, or containing adulterated comb-foundation. Naturally-built combs, such as Virgil deals with, would suffer most from heat.

By lines 50 and 64 the question is raised whether bees can hear. Aristotle[1] doubts it: *ἔστι μέντοι ἄδηλον ὅλως εἰ ἀκούουσιν.* Curiously enough, this question is still unsettled. There is a good deal of evidence on both sides. Gilbert White[2] quotes line 50 and observes: 'This wild and fanciful assertion will hardly be admitted by the philosophers of these days, especially as they all now seem agreed that insects are not furnished with any organs of hearing at all.' He adds that bees thrive well at Selborne, where the echoes are very strong, and that he has tried his own bees through a speaking-trumpet 'with such an exertion of voice as would have hailed a ship at the distance of a mile,' but without producing any effect on them whatsoever.

Lord Avebury[3] tried a violin, a dog-whistle, a shrill pipe, and some tuning-forks, and also tried to teach bees to find honey with the help of a musical-box, but with the same result. Most authorities agree that the 'tinnitus' and 'cymbala,' the door-key and warming-pan of to-day, make no difference at all. On the other hand, bees are musical creatures, and express their emotions through a variety of sounds.[4] Queen-bees may be heard piping to their imprisoned rivals and being answered by them. This suggests that they have some power of hearing, and Lord

[1] *H. A.* ix. 40.

[2] *Letter XXXVIII., to Barrington.*

[3] Lubbock, *Ants, Bees, and Wasps,* pp. 290, 421.

[4] T. Edwardes (*Lore,* c. x.) says they have a compass of at least an octave and a half. *Cf.* Cowan, *Honey Bee,* c. xiv.

Avebury does not deny it.[1] Mr. Richard Kearton, commenting on Gilbert White, claims to have proved that grasshoppers can find each other by sound alone. Mr. T. E. Page says: 'It seems certain that bees dislike noise, and an apiary situated near mills, smithies, or other noisy workshops, is seldom prosperous.' But he gives no authorities for the statement.

According to Cotton,[2] Siberian bees are called to and from their pasture with a whistle, which he says is an ancient practice in the East. He compares Isaiah vii. 18: 'The Lord shall hiss for the fly . . . and for the bee.' The Hebrew for 'bee' is דְּבוֹרָה (Debôrah), which Cotton and J. G. Wood translate 'She that speaks.' The new Oxford Hebrew Lexicon gives no support to this view.

Tickner Edwardes[3] asserts that the most superficial acquaintance with the life of a hive must convince anyone that bees hear acutely. It would be well if he had studied the question less superficially himself. The most that can be said in the present state of knowledge is that it is an open one. Probably bees have *some* sense of hearing, or some faculty that corresponds to it, but as to its nature and range we are very much in the dark.[4]

Mr. T. W. Cowan, one of our greatest living authorities, skilfully avoids expressing any opinion in his scientific work on the bee.

Lines 50-61 are a beautiful piece of description. We find echoes of it in Shakespeare,[5] whose bees

[1] Appendix A, § 4. [2] *My Bee-Book*, p. 338. [3] *Lore*, ch. x.
[4] Appendix B, § 13. [5] *Henry V.* i. 2.

'make boot upon the summer's velvet buds,'[1] and in Gray's *Ode on the Spring:*

> 'The insect youth are on the wing,
> Eager to taste the honied spring
> And float amid the liquid noon:
> Some lightly o'er the current skim.'

Bees usually swarm on a fine day, between the hours of ten and four, but young queens will sometimes lead out a swarm in any weather and at any hour. They do not seek water, but the branch of a tree is the usual settling-place for a swarm, as is well described at the end of the book in lines 557-558. A great many herbs were formerly used for 'medicating' a hive. Cotton mentions mint, lavender, thyme, balm, savory, marjoram, fennel, hyssop, mallows, and bean-top. Hives were also damped with mead or beer, or salt and water. Balm is the 'melisphyllum' of this passage.

Milton's bees (*Paradise Lost*, i. 772)—

> 'On the smoothed plank,
> The suburb of their straw-built citadel,
> New rubb'd with balm, expatiate and confer
> Their state affairs.'

Virgil's battle of the bees seems to be a poetical fusion of two distinct facts. The one is that bees sometimes rob other hives, especially in autumn, when fierce conflicts ensue. The other is that the reigning queen will kill a rival if she can. With regard to robbing, strong stocks may be trusted to

[1] 'Flores' is more accurate than 'velvet *buds*.'

take care of themselves; but when once a colony of robbers has sent out its scouts and discovered a weak hive, the latter is soon overcome, unless the bee-master intervenes.

The description of the trumpet-like voice is especially applicable to the queen, who takes no part in the robber battles, but reserves her sting entirely for royal adversaries. Maeterlinck[1] compares her war-song to 'the note of a distant trumpet of silver; so intense, in its passionate feebleness, as to be clearly audible, in the evening especially, two or three yards away from the double walls of the most carefully enclosed hive.'

A similar, but deeper and less clear, note is uttered by the young queens, in their eagerness to escape from their cells and contest the supremacy.

Swarming frequently follows on the next day, and it is quite possible that Virgil has lapsed into some of the phenomena of swarming when he writes of the conflict high in air and the two kings (*cf.* 77 with 59).

'Spiculaque exacuunt rostris' (74) is difficult to translate satisfactorily, except as a gross error. The most probable explanation is that Virgil misunderstood the cleaning of the antennæ with the legs, which is part of every bee's toilet. 'Insignibus alis' is equally hard to justify (82). The queen's wings, though slightly longer than those of the worker or drone, are very much shorter in proportion to her body.

[1] *Life of the Bee*, § 73.

The throwing of dust has been superseded by mechanical contrivances by which bees may be shut in or out of the hive as desired. But a garden syringe is sometimes used to make bees settle down. Cotton[1] describes how he vainly tried to stop a fight by throwing dust, 'and read them the passage in Virgil, which makes the throwing of dust in the air equivalent to the Bees' Riot Act: "Hi motus animorum,"' etc.; 80-81 are a poetical fiction, for bees do not fight on the wing.

The passage which follows contains a description of two distinct varieties of the honey-bee. 'Ductores' is, of course, a misnomer. But this does not affect the general sense of the passage, for the 'ita corpora plebis' of line 95 makes it clear that Virgil is thinking of the whole colony, which appears to be a mixed one, or one that has become mixed through a fight. The 'turpes' may be either our common black bee (*Apis mellifica*), or the Carniolan bee, a native of Austria, which much resembles it. In any case, Virgil's condemnation is unjust. The brightly-coloured bee, which he prefers, is undoubtedly the Italian or Ligurian variety, imported into England in 1859, and a great favourite with many apiarists. It is the 'golden-girdled' bee of modern poets, handsome and hard-working. In 1887, according to Harrison,[2] Italians beat blacks by quite 25 per cent. Cowan speaks highly of them, and thinks that their introduction has done much to improve our native race by new blood. T. Edwardes, on the other

[1] *Op. cit.*, p. 320. [2] *Book of the Honey-Bee.*

hand, regards them as undesirable aliens, nervous, irritable, and prone to disease. There is much to be said for his view. It may be that *Apis mellifica ligustica* is not well suited to the English climate. The deadly Isle of Wight disease has been laid to her charge as a visitor from the Continent, where the disease is well known. Virgil has allowed himself some poetical hyperbole in describing the difference between the two varieties, but the black bee is more hairy, and comparatively sombre and dull in appearance; while the Ligurian is lighter coloured, and has three distinct yellow rings round the abdomen.

'Premes' (101) is the right word for the ancient process, which is again alluded to in 140. The honey was first drained, then squeezed or pressed out. Hence 'cogere pressis mella favis' (140). Modern apiarists use a honey-extractor by which the comb is emptied, and may be returned uninjured to the hive. The mixture of honey and wine alluded to in 102 is the 'mulsum' of Horace, and resembles the mead or metheglin of England. The proportion of honey to wine or other fermented liquor varied,[1] and still varies. Cotton gives Queen Elizabeth's recipe for metheglin, of which she was very fond.

Tickner Edwardes distinguishes three kinds of

[1] According to Pliny xi. 15, it was composed of two parts of wine and one of honey. Mead is, properly speaking, simply fermented honey and water, metheglin being a spiced form of the same liquor. Dryden translates 102: 'And with old Bacchus new Metheglin join.'

liquor brewed from honey in Anglo-Saxon times. It may generally be seen and tasted to-day at agricultural and horticultural shows, but cannot be sold without a licence. The flavour is excellent. 'Mulsum' is also alluded to in *Georgic* i. 344: 'Miti dilue Baccho.'

Line 103 seems to refer to 'swarming fever,' which is not a disease, but a propensity which gives much trouble to the beeman of to-day, who aims at abolishing natural swarming entirely. Excessive swarming weakens the old stock, interferes with work, and may lead to a serious loss of bees. Virgil's remedy may be either clipping or pulling off the wings, probably the latter. Pliny says: 'Si quis alam ei detruncet, non fugiet examen,' and Columella has 'ipse spoliandus est alis.' Dr. Trapp[1] makes merry over this precept: 'But how shall one *catch* them? or if one could seize them, would it not be difficult to *hold* and *handle* them, so as to *cut their wings?* And would not their majesties be apt to dart out their royal *stings*, and with them their royal *lives?*' As a matter of fact, the queen may be safely handled, for she will not use her sting on a human being;[2] though Cowan[3] has proved that she is not only able to do so, but also able to extract her sting much more easily than a worker. A queen that

[1] Martyn, *ad loc.*

[2] Aristotle knew this: *οἱ δὲ βασιλεῖς καὶ ἡγεμόνες ἔχουσι μὲν κέντρον, ἀλλ' οὐ τύπτουσι: διὸ ἔνιοι οὐκ οἴονται ἔχειν αὐτούς* (*H. A.* v. 21).

[3] *The Honey-Bee*, p. 81.

cannot fly cannot be impregnated by the drone, but after impregnation her wings may be clipped if necessary.[1] The practice is not usual, but not unknown. Digges gives full directions. The clipping can be done on the comb without handling the queen.

Virgil implies that the hive has two reigning sovereigns. T. Edwardes[2] asserts that as many as five queens[3] have been known to share a single hive, and that a hive with more than one queen will not swarm.

Lines 107-108 are not literally true, but a swarm without a queen will soon return to the hive.

The 'croceis floribus' of 109 probably means simply 'coloured flowers.' There would be no special point in 'yellow.' Lord Avebury has proved that the bees prefer blue to any other colour. But individual bees generally confine each foraging journey to one particular kind of flower, and a load of pollen may frequently be traced by its colour. 'The deep brown-gold panniers came from the gorse-bloom; the pure snow-white from the hawthorns; the vivid yellow, always so big and seemingly so weighty, had been filled in the buttercup meads. Now and again, in early spring, a bee would come blundering home with a load of pallid sea-green hue. This came from the gooseberry bushes. And later, in summer, when the poppies began to throw their scarlet shuttles in the corn, many of these cargoes

[1] Appendix B, § 14. [2] *Lore*, ch. vii.
[3] Buffon's 'later observers' said five or six.

would be of a rich velvety black.'[1] Thus writes Mr. T. Edwardes in his chapter on 'A Bee-man of the 'Forties,' a 'Corycius senex' of later times.

The digression on gardening, of which the old Corycian is the central figure, is not directly concerned with bees, but the number of honey and pollen-yielding blossoms mentioned in it can hardly be accidental. Cotton specially mentions cucumbers as profiting by the visits of bees, which indeed are very necessary in fruit-growing districts, to fertilize the blossoms. The Corycian's garden and apiary owed much of their success to their mutual relationship. The narcissus is mentioned again in 160 as useful for comb-foundation. Ivy sometimes provides a late harvest in October, when other flowers are dead. Vervain, if Heyne may be trusted, was 'apum causa sata.' Lilies are mentioned in *Aeneid* vi. 709 as affording pasture for bees. Michelet says they are fond of water-lilies. The poppy occurs in the quotation from T. Edwardes above. It yields abundant pollen. Limes are great favourites with bees. Pears, sloes (blackthorns), and fruit-trees generally are sure to be musical with bees when in bloom (*cf.* 'poma' 134). Pines are mentioned also in 112. The 'uberrima pinus' (141) was presumably planted for propolis, but also for pollen from the ripe male cones, whence the epithet. The hyacinth is mentioned again with the lime in 183.

'Apibus fetis' (139) is hardly consistent with what

[1] *Bee-Master of Warrilow*, ch. v.; *cf. Lore of Honey-Bee*, ch. iv.

Virgil says later about the generation of bees. But it may be translated loosely as 'parent-bees,' with Papillon and Haigh. Heyne settles the difficulty with 'apes fetae melle.' But the context is against him.

In 149 we return to the natural history of bees. The piece of mythology which introduces it rests on the assumption that bees can hear the 'cymbala' of 64, which there is good reason for doubting.

The 'solae' of 153-5 leaves out the ant and the wasp, though 156-7 remind us of the 'inopi metuens formica senectae' of *Georgic* i. 186.

In the making and administration of the 'magnae leges' (154) the queen counts for nothing. All is done by the mind or spirit of the hive, that mysterious influence which no naturalist has quite fathomed. 'The mind in the hive is the collective mind of the whole colony, apart from the queen and drones—an hereditary, communal intellect evolved through the ages, the sum and total of all bee experience since the world of bees began.'[1]

Despite their reverence for law, no maxim is more certain than that bees do nothing invariably. Their originality in comb-building is noticed below. But it is equally certain that a bee does nothing alone. 'Isolate her,' says Maeterlinck,[2] 'and however abundant the food or favourable the temperature, she will expire in a few days, not of hunger or cold, but of loneliness." In her self-sacrifice she is a relic of

[1] T. Edwardes, *Lore*, ch. v. [2] *Op. cit.*, § 7.

the Golden Age pictured in *Georgic* i. 127. 'In medium quaerere' is part of the honey-bee's nature; but whether this is genuine unselfishness, or merely a useful form of selfishness, is open to question. Mr. Kay Robinson[1] thinks that 'each individual is really working independently, obeying the imperative instinct with which it is endowed by nature; and the fact that its work dovetails in so well with the work of the other members of the community is due to the evolution of the species as a gregarious insect.'

Maeterlinck's beautiful book would not have been written had he believed this, and it can hardly represent the whole truth. The bee is far too wonderful a creature to be fully accounted for by such a theory. She is, even more than man, a 'political animal'; and Virgil was not far wrong when he clothed her with all the excellences of the Roman city-state.

Such phrases as 'foedere pacto' (158) raise again the question whether she has any real sense of duty; or is a mere automaton in the hands of Nature. But the division of labour is a fact. It is regulated by the age of the bee. For the first twelve or fourteen days of her existence the worker-bee is employed in the hive. During this period her 'milk' glands, and wax-making organs a little later, are well developed; while after her first month of life both are greatly reduced. As soon as she is fit for foraging she carries pollen, and later deserts pollen for honey. She thus begins life as a nurse and ends it as a honey-bringer. The 'grandaevis oppida curae,' etc., of lines 178-180

[1] *Religion of Nature*, p. 137.

is an unfortunate afterthought. Virgil has fallen into the same error as Aristotle, who is quoted in all good faith by Martyn and Conington. The 'shaggy' (δασεῖαι) are really the young bees; the λειότεραι are the older bees, worn smooth and shiny by hard work.

The famous passage in *Henry V.* (i. 2) is utterly unscientific. Page quotes it in full as 'the best illustration of Virgil and the best commentary on him.' Literary critics do not always discover the truth in such matters, but Professor Walter Raleigh[1] is an exception. 'The famous passage on the bees in *Henry V.* is glittering poetry; but "as a description of a hive," says a critic of knowledge and parts, "it is utter nonsense, with an error of fact in every other line, and instinct throughout with a total misconception of the great bee-parable." Virgil knew something of the bee; Shakspeare little or nothing.'[2]

With 'narcissi lacrimam' many commentators compare Milton's *Lycidas*:

'Daffodillies fill their cups with tears.'

Conington suggests that Milton's 'tears' refer to rain or dew. But Milton is probably echoing Virgil, whose reference seems to be either to the story of Narcissus[3] or to a mistake of primitive naturalists. Narcissi yield pollen, but not propolis, a substance which has already been explained, and is here well called 'lentum gluten.' It is usually gathered from

[1] *Shakespeare* (*English Men of Letters*), p. 37.

[2] Appendix B, § 15.

[3] So Mr. James Rhoades translates it: 'Narcissus' tear' (*cf.* 122).

buds, but also from the gum that exudes from the trunks of some trees.

'Fundamina' (161) appears to mean not the foundations of the comb, but the propolis by which it is glued to the hive. The 'tenaces ceras' are the foundation, as modern bee-keepers understand it. Artificial comb-foundation is usually supplied now. It saves the bees time, and by it the number of drone-cells can to some extent be regulated at the discretion of the bee-master. Cowan estimates that at least one-half the work of the bees is saved by this excellent invention. It also ensures straighter and more uniform combs. 'Suspendunt' is the right word, for bees build from the top downwards. But they have been known to build upwards when no other way was possible. In line 57 'excudunt' is applied to 'ceras,' and 'tenax' is transferred to the honey. Probably Virgil was quite unaware that wax is a secretion of the bee. This was discovered by Hüber. From ten to seventeen pounds of honey are consumed in the production of one pound of wax, which oozes out in plates or scales from the 'wax pockets' on the under side of the abdomen. To secrete it the bees have to obtain a high temperature (87° to 98° F., Cowan) by close clustering.

'Educunt fetus' (163) suggests that the young bees are taught by their elders to forage. This is not true, but it appears that they need experience. T. Edwardes[1] says they may be seen searching the most unlikely places, even the leaves of a plant

[1] *Lore*, ch. xiii.

instead of its flowers, and begin by making a succession of blunders. Nectar (164) is, properly speaking, the pure product of the flower before it is converted into honey by the stomach of the bee. Sentinel bees (165) are always on duty, day and night, except in winter.

The sentinels are not the same bees that perform the other tasks assigned in 166-168,[1] and probably this is Virgil's meaning, as Conington and Page suppose. If so, most of the translators are wrong, but Mr. Mackail is an exception. The drones are not expelled, as a rule, till August, when they all either die of starvation or are massacred by the workers. Till then they are allowed to enjoy life, and are partly fed by the workers; for a drone will die in three days if deprived of the rich chyle-food which was supplied to him as a larva. Drones are said to be useless, except for breeding purposes,[2] and even then only about one in a thousand has the opportunity, unless their number is strictly limited by the bee-master; hence the character for idleness which the drone has acquired, and the quaint speculations about him in old writers. Virgil's references to him are very cautious (*cf.* 244). In this he shows himself the superior of many later writers. Even Martyn describes the drones as 'a sort of bees without stings,

[1] But the whole or greater number will act as sentinels if necessary. Lord Avebury found the same bees doing sentry-duty day after day (*op. cit.*, p. 289).

[2] But probably they help to keep up the warmth of the hive, especially when wax is being made.

which do not assist the others in their labour. . . . Some affirm that the drones are the males.' Heyne writes: 'Dronen, apes maiores iis qui mel faciunt,' and follows this with a long quotation from Columella (ix. 15. 1), which very nearly arrives at the truth: 'Verumtamen ad procreationem sobolis conferre aliquid hi fuci videntur, insidentes seminibus, quibus apes figurantur.'

Sir J. More in 1707 was right as far as he went, and had no doubt of it: 'The Drone is a gross, stingless Bee, that spendeth his time in idleness; yet there is such a necessary use of him, that without him the Bee cannot be: it is the opinion of some that he is made of a Honey Bee, which is even as likely as that a dwarf, having his guts pulled out, should become a giant. The truth is, the Drone is of the same species with the Honey Bee, but of a different sex, and by whose masculine virtue and natural heat the Honey Bee secretly conceiveth' (*England's Interest: or, The Gentleman and Farmer's Friend*, ch. vi.). T. Edwardes[1] quotes an old writer, who is at once true to facts, and an excellent illustrator of Virgil's allusions: 'A grosse Hive-Bee without sting, which hath always been reputed a greedy lozell: for howsoever he brave it with his round velvet cap, his side gowne, his full paunch, and his lowd voice; yet he is but an idle companion, living by the sweat of others' brows. For he worketh not at all, either at home or abroad, and yet spendeth as much as two labourers: you shall never find his maw without a

[1] *Lore*, ch. iii.

good drop of the purest nectar. In the heat of the day he flieth abroad, aloft, and about, and that with no small noise, as though he would doe some great act: but it is onely for his pleasure, and to get him a stomach, and then returns he presently to his cheere.'

It should be allowed, however, that his flights abroad are also to look for a queen.

The simile which begins in line 170 ought not to need the solemn condemnation of some commentators and the elaborate apologies of others. Virgil apologizes sufficiently for it in 176-178. The comparison was never meant to be pressed, and minute criticism is out of place. As Page remarks, Virgil would thoroughly have enjoyed reading the graver commentators on some of his work.

'Munire favos' (179), in spite of Conington, Heyne, and others, had better be understood literally of sealing the full honey-combs, rather than as merely synonymous with 'fingere tecta.' 'Favus' is the same word as in 141, and does not keep up the metaphor of a town. '*Multa* nocte' ('late at night') is criticized by Keightley and Conington as inaccurate. Bees do not usually leave the hive after nightfall, but on light July nights may be heard working in lime-trees, and have even been known to swarm at night, if report be true. '*Crura* thymo plenae' cannot be excused as a poetical hyperbole. Thyme[1] and wild thyme ('serpullum,' 31) yield

[1] Varro (iii. 16. 11) speaks of a thyme-garden of one acre near Falerii which produced at least 10,000 sesterces a year (£100) in honey.

honey, not pollen; and honey is not carried in the hairy 'pollen-basket' on the hind-legs, but in the honey sac.[1] They are favourite food-plants, as Virgil's frequent allusions testify. In *Eclogue* v. 77 and 169 of this book thyme is chosen as the chief of all. In 112 the bee-keeper is directed to plant it in his garden. Of the other plants and trees mentioned here, limes and hyacinths were found in the old Corycian's garden. Willow, says T. Edwardes, provides the earliest nectar in Southern England. Crocus performs the same service with pollen. Cassia is mentioned also in 30 of this book, and in *Georgic* ii. 213, where it is linked with 'rorem' (rosemary). 'Rorem' is spoken of in *Eclogue* v. 77 as food for 'cicadae'; but there it is simply 'dew,' and here there can be no doubt that Virgil means 'rorem maris.' In ii. 434 willows[2] are mentioned with broom as 'pabula melli.' Brooms, like gorse, yield pollen.

'*Pinguem* tiliam' (183) has given the commentators some trouble. Heyne says: 'a melle florum et foliorum, quod exudant, glutini apum idoneum.' Conington, probably copying him, says: 'called "pinguem" from the gluten on its leaves.' Nettleship and Haverfield have let this stand. Page obediently quotes Conington. Mr. Rhoades translates

[1] Milton makes the same mistake:

> 'While the bee with honied thigh
> That at her flowery work doth sing.'
> (*Il Penseroso*).

[2] For willow, *cf. Eclogue* i. 54.

'glue-yielding limes,' doubtless misled by so goodly a company. Keightley, with more sense, says 'probably on account of the honey-dew that lay on it.' This may be right, but what more natural epithet could Virgil have chosen for such a favourite source of honey as a lime-tree in flower? 'A melle florum' is quite enough (*cf.* 14 and 118).

With regard to the rest and sleep of the bees (189-190), it is doubtful if they ever really sleep, even in the coldest winter. T. Edwardes compares the sound of a 'sleeping' hive to the angry roar of the sea. Hibernation is only partial, for warm sunny days will always lure bees out. Cleansing flights are needed about once a month, for the worker-bee, when in health, has the power of retaining the fæces, which are never voided in the hive.

'Siletur in noctem' is true enough of a small stock, even in summer, but 'sopor suus,' the needful, well-earned *νήδυμος ὕπνος*, sounds beautiful and probable, and that is all we can dare to say.[1]

'The fact of bees ballasting themselves with stones,'[2] as Conington calls it (194), is a pure fiction. Bees are accomplished aeronauts, able to fly backwards and stop when they will, their four wings and flexible abdomen serving every purpose. Anyone may verify this by standing near a hive, and watching the bees arriving and departing. Magnified to the size of a sparrow, their feats would be marvellous in the extreme. Cotton discovered that a bee could

[1] Appendix A, § 4.

[2] This mistake is found in Aristotle (*H. A.* ix. 40).

balance with only one leg loaded. Can it be that Virgil or Aristotle observed bees carrying dead larvæ or pupæ or refuse away from the hive (as they regularly do), and mistook these for small stones?

The belief in the spontaneous generation of bees, more fully expounded by Aristotle and Pliny, has a foundation in fact which no commentator seems to have discovered. Parthenogenesis is a phenomenon well known to apiarists, for the drone has no male ancestor nearer than his grandfather. This can be demonstrated by cross-fertilizing, say, a black queen with an Italian drone. The resulting drones will be pure blacks, while the workers will be hybrids. (A few mysterious exceptions have been known to this rule.) Thus, a virgin queen that has never left the hive can lay fertile eggs, but these will all produce drones. The same is true of that *lusus naturae*, the fertile worker. Another point worth noticing is that impregnation can only take place on the wing. No human eye has yet witnessed the nuptials of the queen-bee. After a few preliminary flights, during which she takes stock of her landmarks, she soars aloft, pursued by rival drones. Only the strongest and swiftest can overtake her and expel the spermatophore from his body into hers. He then falls lifeless to the ground, and she returns to the hive trailing part of the male organs behind her. A single impregnation suffices her for a life of four or five years, and in the height of the season she will lay, when in her prime, not 'at least 200 eggs a day'

(Page), nor 'several thousand every summer' (Martyn), but *from* 2,000 to 3,000 *eggs a day*.

The spermatozoa, or male element, are stored in the spermatotheca, and emitted or not, at will, as the egg passes down the oviduct. Drone cells are larger than worker cells, and the queen is guided by the size of the cell in which she lays. The excessive number of the 'ignavum fucos pecus' (168) is Nature's provision against inbreeding, and also against the loss of the queen or the failure of her errand; for the greater the number of the drones from other hives, the greater the chance the queen has of securing one, and that a strong one, on the first opportunity.

The fact that coition can only take place on the wing is another wonderful security of the same kind. The male is so constructed that his organ cannot be brought into use on the ground, but only when the tracheæ and sacs are expanded with air, and pressure thus produced on the abdomen. In the race for the queen natural selection eliminates the unfit.

All this marvellous story, which savours of the miraculous, but is now common property among naturalists, helps us to understand the 'quod neque concubitu indulgent' (198) of the ancients. Huber enclosed a queen with a drone in a box, and Virgil might have done the same with the same results. The perpetual virginity of the workers, the vast majority of the population, which are really undeveloped queens, would confirm the superstition. The eggs which produce queens and workers are identical, the difference being brought about after

hatching and entirely by feeding. Why richer food should cause not merely better development, but actual differences of structure, is a mystery that no one has fathomed. Possibly the greater space in the queen cell is an important factor. Provided that the grub is not more than three days old, it can be converted into a queen at the will of the workers.

'E foliis . . . et suavibus herbis' (200) is probably due to pollen being mistaken for eggs. Aristotle, as Conington points out, went so far as to mention the trees and plants by name, though he quotes the opinion as that of others. But it is only fair to him to add that, according to some of his authorities, drone eggs are carried from trees and plants, but worker eggs produced by the queens (*τοὺς ἡγεμόνας*).[1] Columella was an early sceptic, doubting whether bees 'concubitu sobolem procreent, an . . . floribus eligant, quod affirmat noster Maro.'[2]

Considering that the belief in spontaneous generation persisted till the day of Pasteur and his celebrated sealed bottles, it is not surprising that an unscientific age applied it to larger creatures, even mice. Lecky[3] gives a curious quotation from Vives (*De Anima*, i.): 'De viventibus alia generationem habent spontaneum, ut muscae, culices, formicae, apes: quae nec sexum ullum habent. Alia ex commixtione sexuum prodeunt, ut homo, equus, canis, leo. Sunt quae ambiguam habent procreationem, ut mures; nam eorum alii ex sordibus sine concubitu, alii ex concubitu prodeunt.'

[1] *H. A.* v. 21. [2] *R. R.* ix. 2-4.
[3] *History of Rationalism*, vol. i., p. 342.

The belief that young bees were gathered from flowers is found as late as 1679 in the *Further Discovery of Bees* of Moses Rusden, Bee-Master to King Charles II.[1] Butler, who wrote under Queen Anne, was almost alone in his day in rejecting this theory.

The fraying of the wings (203) may frequently be noticed in old bees. The natural term of life in a worker bee is no more than six weeks, but those born late in the autumn live through the winter and raise a new stock in the spring. These may live six months. A queen is considered old enough after two years by modern bee-masters, but will live four or five if allowed. Her fertility declines after her second season. Not even a queen will live seven years (207). Virgil is probably copying Aristotle, who gives ten years as the maximum for a swarm, and six or seven for the individual bee.

The passage 210-218 is in the main true to facts. The bees seem to know that the life of the hive depends entirely on the queen. If they lose and fail to find her after a few hours' search, they begin to raise another from a worker grub. If they have no grubs under three days old, they grow idle and listless, and, unless supplied with another queen, gradually perish. Line 214 is an exaggeration, and 'operum custos' (215) is of course a mistake already noticed. 'Attollunt humeris' (217) may be true occasionally, but they usually protect the queen by thronging round her (216). An intensification of the same

[1] T. Edwardes, *Lore*, ch. iii.

method, known as 'balling,' is used for suffocating a strange or useless queen.

In the passage 219-227[1] Virgil is hardly consistent with himself. He seems to be divided between the theory that bees are specially inspired, and the theory that all living things contain some divine essence. In i. 415 he rejected the latter theory. Here he seems to join the Stoics against the Epicureans. The commentators give many parallels.

The question of the intelligence of the bees is more or less open, as Virgil leaves it. Lord Avebury's[2] experiments led him to take a somewhat low view of it. In their originality, care for one another, and devotion to their queen he discovered serious limitations.[3] Maeterlinck takes the opposite side with more zeal than caution. Kay Robinson has already been quoted.[4]

Probably the detractors have suffered from being led to expect far more than they found. The bee's intelligence is, after all, not human; but the bee-republic as a whole is a civilization of a very high order, and implies mind somewhere at the back of it. The brain of the bee[5] is about $\frac{1}{1\frac{1}{7}\frac{1}{4}}$th of its body; that of the ant $\frac{1}{2\frac{1}{8}\frac{1}{6}}$th; and so on, through the ichneumon and cockchafer, to the dytiscus or water-beetle $\frac{1}{4\frac{1}{2}\frac{1}{0}\frac{1}{0}}$th. The queen and drone have a smaller brain. Other interesting facts are quoted by Cowan, who

[1] Plumtre quotes it on Ecclesiastes xii. 7.
[2] *Ants, Bees, and Wasps*, pp. 278-287.
[3] Appendix B, § 16.
[4] See p. 74.
[5] Cowan, *Honey-Bee*, p. 70.

sums up with the words: 'it is impossible to deny mental faculty to [the worker-bee].'

Modern naturalists find the line between instinct and reason increasingly difficult to draw. It has been asserted that the cell of the bee has never varied since history began, and this was actually urged against Darwin's theories half a century ago. The shape of the cell has also been traced not to any intelligence on the part of the bee, but to 'statical pressure according to the laws of equilibrium.' But the bee has proved herself capable of adapting the shape of her cell and her comb to altered circumstances. If she cannot build downwards, she will build upwards, and if the hexagonal form of cell does not suit the situation she will build square or acute-angled cells, as Cowan[1] shows by illustrations. In fact, 'although the bees may endeavour to arrive at a perfectly symmetrical cell, they hardly ever obtain one.'

The cells-walls are only $\frac{1}{180}$th of an inch thick, yet, according to T. Edwardes,[2] the comb will not merely support, but suspend a weight thirty times greater than its own.

There seems to be no doubt that a swarm sends out scouts, which come and report when they have discovered a suitable place for the new home.

But these are only a few examples out of a vast number of facts which tend to prove the existence of intelligence of a high order in the bee. Either she possesses something more than instinct, or she has

[1] *Honey-Bee*, p. 185. [2] *Lore*, ch. xii.

been the object of Divine 'directivity' to an exceptional degree. The evolution of the bee has not been accomplished by mere natural selection. Virgil had a glimpse of the truth when he wrote of 'naturas apibus quas Juppiter ipse addidit' (149, 150). The Koran, in its chapter on the bee, agrees with him: 'The Lord spake by inspiration unto the bee.'

Virgil's directions for taking the honey, or 'vindemiating' the bees, as John Evelyn calls it, are vastly superior to the method of killing them with the fumes of sulphur, which was still common even in the nineteenth century. At the present day smoke is used, with only this difference, that whereas Virgil used 'fumos *sequaces*,' to drive the bees away, the modern apiarist uses it to frighten the bees, which immediately gorge themselves with honey, and may be handled with comparative impunity. Smoking bees *away* is not usual now, but appears to be still the rule in Cyprus, where cylinders of earthenware are used as hives. 'When it is required to secure the honey the cover at the back end is removed and smoke blown in, the bees escaping by their usual front entrance.'[1] *Aeneid* xii. 587-592 is worth comparing.

'Ora fove' is good advice, for bees dislike breath or sweat or any strong smell (*cf.* 49). A draught of beer used to be recommended, but is obsolete now. Butler's *Feminine Monarchie*[2] (ch. i. 33) has a fine passage:

'If thou wilt have the favour of thy Bees, that they

[1] *Bee-Keeper's Record*, February, 1912. [2] Cotton, p. 98.

sting thee not, thou must avoid some things which offend them: thou must not be unchaste and uncleanly; for impurity and sluttiness (themselves being most chaste and neat) they utterly abhor: thou must not come among them smelling of sweat, or having a stinking breath, caused either through eating of leeks, onion, garlick, and the like, or by any other means, the noisomeness whereof is corrected with a cup of beer: thou must not be given to surfeiting or drunkenness: thou must not come puffing and blowing unto them, neither hastily stir among them, nor resolutely defend thyself when they seem to threaten thee; but softly moving thy hand before thy face, gently put them by: and lastly thou must be no stranger unto them. In a word, thou must be chaste, cleanly, sweet, sober, quiet, and familiar, so will they love thee, and know thee from all other.'

The two harvests (231-235) are mentioned by Aristotle, Varro, and Pliny. Varro[1] gives three—'vergiliarum exortu,' 'aestate acta,' and 'post vergiliarum occasum.' The season may begin any time in the spring and last to the end of September, or, where ivy is plentiful, even into October, in this country. But in Southern Europe, where the winters are short, it may well have been customary and profitable to take the honey twice or thrice a year.[2] The barbarous practice of killing the bees before winter would have rendered this impossible.

[1] *R. R.*, iii. 16, 34.

[2] Aristotle (*H. A.* v. 22) speaks of a race of bees in the Pontus, 'which make honey twice a month.'

Line 239 is understood by Keightley to mean 'if you wish to preserve the stock through the winter.' It may be that some stocks were allowed to die of starvation, for Virgil says nothing about artificial feeding, which is considered essential now. If no candy is given in winter, care must be taken that sufficient honey is left to support the hive till the spring flowers may be depended on.[1] 'It is a lamentable fact,' says Cowan,[2] 'that hundreds of strong, prospering colonies perish every year for want of timely attention with regard to the store in the hive.' But in 248-250 Virgil is asserting another truth. Leaving surplus honey only makes the bees idle. The most profitable plan is to feed them freely at all seasons, and remove the large surplus that results. But, again, the feeding must not be overdone, or the honey will be simply raw syrup.

'Morsibus' (237) is no proof that 'Virgil forgets that bees do not bite' (Sidgwick). The context shows that he knew something about stings. '*Morsus* pro aculeorum ictibus dici, obvium' (Heyne). 'Morsus' is used by other writers metaphorically ('doloris, curarum,' etc.) where we should say 'sting.'[3]

'Animasque in vulnere ponunt' (238) is not always true. A bee's sting is barbed, and in her haste to get away she generally loses sting, poison-sac, glands, and the lower portion of the abdomen as well. If this happens, she invariably dies, but may live for

[1] 'But when the bee-keepers take out the combs, they leave them food through the winter' (Aristotle, *H. A.* ix. 40).

[2] *Guide-Book*, p. 109.

[3] Appendix B, § 17.

an hour or more, as Lord Avebury[1] discovered. But if given time, she will sometimes extract her sting and be none the worse. The commentators are all inaccurate here.

Fumigation (241) is regularly used now for disinfecting purposes after disease, and old combs need removing when they become dirty and choked, or perforated by the larvæ of the wax-moth (*Galleria cerella*), the 'dirum, tineae, genus.' 'Blatta' is the cockroach, erroneously called the black-beetle; and 'stellio' is probably the newt or eft, but Keightley identifies it with the lizard of line 13. Martyn says it is 'a small spotted lizard, called also a swift.' From this and his note on line 13 it appears that he means the common newt. Spiders (247) catch bees in their webs.

It is strange that Virgil has omitted the wasp.[2] Other pests are the ant, blind louse, toad, earwig, and the *Sphinx atropos*, or death's-head moth, which, according to Michelet, came to Europe from America with the potato shortly before the French Revolution, and gave much trouble to bee-keepers.

With line 251 begins a long passage about diseases of bees and their remedies. What particular disease Virgil has in mind it is not easy to determine. Bees are subject to dysentery, foul brood of various kinds, bee paralysis, May pest, and the Isle of Wight bee disease. Probably he is describing several of

[1] *Op. cit.* p. 283.

[2] Aristotle mentions it more than once (ix. 40). *Cf.* Varro iii. 16. 19.

these as one disease. Dysentery is due to improper feeding in winter, or unsealed honey which has fermented. It can be cured by medicated food, such as Virgil prescribes, and warmth. Galls (267) are astringent, and would be good for dysentery. Foul brood, and its varieties, black brood and sour brood, chiefly affect the brood or larvæ. Pliny speaks of 'blapsigonia' (xi. 20), which was doubtless foul brood. It is terribly contagious, and, if not checked early, almost incurable. But Virgil's symptoms are applied to the perfect insect, no reference being made to larvæ or pupæ; hence his disease was probably, first and foremost, some kind of bee paralysis.

His description would then be true, and the total loss of the whole stock (281) easily accounted for. Epidemics work great havoc in so compact a society as a hive. Della Rocca mentions that Syra in the Cyclades lost nearly every colony through disease in 1777-1780.

The May pest, 'mal de mai,' or 'Maikrankheit,' raged in France and neighbouring countries in 1853 and 1855 after wet and cold springs, and about ten years later two-thirds of the hives were lost in Northern France from the same disease, which is a form of paralysis. The bees gradually lose the power of flight. 'They will also be seen towards evening gathering in clusters for warmth, but most of them die during the night from exposure.'[1] This agrees with Virgil (257-259). Dead bees are carried

[1] Cowan, *Guide-Book*, p. 187.

away from the hive if possible (255), or at least thrown outside it.

Another form of paralysis, the Isle of Wight bee disease (*microsporidiosis*), was first observed in 1904, and decimated the old stocks in the Isle of Wight to such an extent that fruit-growers complain of the scarcity of bees in their orchards. Already well known on the Continent, it soon found its way to England, with dire results in some counties. No certain cure has yet been discovered. It is being investigated by the Board of Agriculture and Fisheries, and in 1908 was taken up by European bacteriologists. Since then a Bee Diseases Bill has been before Parliament.

The Master of Christ's, Cambridge, writing in *Country Life* of May 20, 1911, describes the symptoms as 'first a disinclination of the bees to work and a habit of flying about aimlessly; then they begin to lose their power of flight, and are unable to travel more than a few yards without alighting, till finally they can only crawl, and may be seen creeping up grass stems or other upright objects. After that the end comes quickly and they die. . . . The queen and the brood are not affected.'[1]

Cures have been reported, but the best hope of saving a colony is, at present, to destroy all affected stocks at once. The method of replacing them

[1] According to later reports the queen is not immune. Dr. Shipley has another article in *Country Life* of July 19, 1913. He compares the world-wide havoc played by silk-worm disease in the last century.

described in the last 300 lines of the book is unfortunately an elaborate fiction. Several of the commentators settle the question in their own way, but none of them satisfactorily. The story of Samson is usually quoted in support. 'We have the authority of the Holy Scriptures,' says Martyn, 'that bees will proceed from the putrid carcase of an animal.' The queen-bee, according to him, had laid her eggs in the lion's body, to be hatched by its fermenting warmth. Page is bold enough to say: 'That bees will settle in a decaying carcase is well known.' Even Keightley thinks that the admission of the queen-bee through an open window 'clears the whole mystery.'

But, apart from the difficulty of accounting for this independent enterprise on the part of the queen-bee, there remains the fact that bees loathe carrion. Virgil himself has noticed their dislike of strong smells (48, 49). The bee, as Aristotle observes, is a very clean creature, and a swarm in a decaying carcase is out of the question. Accordingly, Tickner Edwardes dismisses Samson's honey as unhistorical. But this is unnecessary. 'We must not suppose that the carcase was a putrid and corrupt mass, for in the dry season the heat will speedily render a carcase in that climate a mere mummy without any offensive smell until it is moistened, and the ants speedily clear away all the softer parts of the body, if any are left by the vultures, so that merely the skeleton and hide would remain.'[1]

[1] Tristram, *Nat. Hist. of the Bible*, p. 324, 'The Bee.'

The story in Judges xiv. leaves plenty of time for this to occur, for in a few hours a carcase may be reduced 'to a ligamentous skeleton, which is soon dried in the fierce heat, and would make as savoury a hive as the cowdung-plastered baskets which are used for raising bees.'[1] Samson's honey is thus easily accounted for, but Virgil's story, which appears in Florentinus and other writers,[2] requires a different explanation. The first thing to notice is that honey is conspicuous by its absence. No one ever speaks of seeing these ox-bred bees settle in a hive or produce honey. The details of the putrefying flesh cannot be explained away, and the best solution seems to be that these insects were not bees at all, but drone-flies, which resemble bees so closely as to deceive even good observers. The swarm at the end of the book (558) may fairly be regarded as a poetical embellishment.

The rest of Virgil's description will suit the drone-fly (*Eristalis tenax*) sufficiently well. Michelet, in his chapter on 'The Bees of Virgil,' describes these pseudo-bees in a cemetery. 'Réaumur confesses that for a moment even he was deceived by them.' If

[1] Hastings, *Dict. of the Bible*, 'The Bee.' 'At the present day swarms of wild bees often make their habitations within the desiccated bodies of dead camels that have perished on the way' (J. G. Wood, *Bible Animals*, p. 608).

[2] *Cf.* Varro iii. 16. 4: 'Primum apes nascuntur partim ex apibus, partim ex bubulo corpore putrefacto. Itaque Archelaus in epigrammate ait eas esse—

'"βοὸς φθιμένης πεπλανημένα τέκνα,"

(idem) '"ἵππων μὲν σφῆκες γενεὰ, μόσχων δὲ μελίσσαι."'

Michelet and Réaumur could be deceived, it is not wonderful that this superstition lasted into the seventeenth century.

Cotton[1] has preserved an account of how Virgil's experiment was successfully conducted in Cornwall: 'I did ever think that the generation of bees out of the carcass of a dead calf, given us by divers of the ancients, but most amply and elegantly by Virgil in the fourth book of his *Georgicks*, had been a fiction, but am glad to find the contrary by your letter, which confirmed the same out of modern and English experience.'

A superstition which gave birth to so beautiful a passage as the second part of the fourth *Georgic* must be judged mercifully. Michelet, at least, will not laugh at it. For him Virgil is a holy prophet, as he was to Christian readers of the fourth *Eclogue* in the Middle Ages. 'I know, I feel, that every word of this great sacred poet has a weighty value, an authority which I would designate as that of an augur and a pontiff. . . . His "Resurrection of the Bees" is a song full of immortality, which, in the mystery of Nature's transformations, embodies our highest hope—that death is not a death, but the beginning of a new life.'

[1] *Op. cit.* p. 354.

APPENDIX A

§ 1. See Page 2.

'Oxen used to be employed on many farms in Sussex, but are now almost given up. They are broken in when two years old. They work about two miles an hour. No bits or reins are used, but a long hazel goad' (*Country Life*, August 31, 1912).

Since then the following has appeared in the *Morning Post:*

'What is thought to be the last team of draught oxen in Sussex was sold at Housedean Farm, near Lewes, yesterday. The beasts were used on the South Downs under an aged teamster named Frank Richardson, and visitors from far and near came to see them. They were disposed of in four pairs at £37 to £46 a pair. The wooden yoke was purchased by the Mayor of Brighton for presentation to the Brighton Museum.'

§ 2. See Page 53.

Mr. G. A. B. Dewar thinks the Countess Cesaresco's case is not proven. I wrote to him on the subject last year, and this was his reply in the *Morning Post:*

'I now remember that a friend with whom I was staying at Levanto at the beginning of the fourth week in April last year told me that the nightingale sang on into the summer there. But when do the nightingales

finish their nesting in that and other parts of Italy? I searched for nests in the Apennines on April 22, 23, and 24, and though there were birds singing all abou me I could not find a trace of a nest yet begun, and it is my belief that neither nightingales nor blackcaps, if indeed willow warblers, had begun to build. The nesting season of these and other birds in the South is not so early as one might suppose.

'Hence I think it very likely that nightingales may be heard in June throughout Italy, whether they usually sing after the young are hatched or not. A June nightingale in full song in Italy need break no rule we know in England.

'But if the nightingales of Mantua—or of Levanto—continue to "drown the noise of the engines" through July, I think we must revise our English lore about the bird. Shakespeare thought the "temple-haunting martlets" nested more freely where the air was most delicate. I am not confident this was good natural history. Would it be any better natural history to assume that nightingales sing more freely and longer where the air is most delicate?'[1]

There is special force in 'late . . . implet' (515), for the nightingale's song has extraordinary carrying-power. Tennyson compares music to it in the *Vision of Sin*:

> 'Storm'd in orbs of song, a growing gale;
> Till thronging in and in, to where they waited,
> As 'twere a hundred-throated nightingale,
> The strong tempestuous treble palpitated.'

I myself have heard the nightingale on a still night at a distance of at least half a mile as the crow flies.

[1] Mr. Warde Fowler tells me that Italian nightingales often have a second brood, and sing in July.

Appendix A

§ 3. See Page 59.

The late Professor Churton Collins,[1] commenting on this line, remarked that, 'for very obvious reasons,' the swallow does *not* hunt the bee. But in 1900 he received a letter from Samuel Deacon, a bee-keeper at the Cape of Good Hope, saying that he had shot great numbers of the swallow tribe (three different species), and found them 'choke full of my poor bees.' He adds that they catch workers as well as drones, not heeding the stings.

Gilbert White[2] has an interesting story of an idiot boy who enjoyed immunity from stings, sucking the bodies of bees for the sake of their honey. 'He was a very *merops apiaster*, or bee-bird, and very injurious to men that kept bees; for he would slide into their bee-gardens, and, sitting down before the stools, would rap with his finger on the hives, and so take the bees as they came out. He has been known to overturn hives for the sake of honey, of which he was passionately fond.'

§ 4. See Pages 62, 65, and 81.

1. Do bees sleep?
2. Do they hear?
3. Do they ventilate the hive by fanning?

These three questions were answered for me by Mr. Herbert Mace, bee expert to the *Field*, in the *Field* of July 26, 1913.

1. 'That bees sleep in the same sense as man is unlikely, since the salient feature of sleep is a dormant condition of the brain. In animals in which the brain is not entirely centralized there is rarely an entire suspension

[1] *Life and Memoirs*, p. 150.
[2] *Letter XXVII., to Barrington.*

of consciousness. Nevertheless, bees rest motionless for very long periods sometimes, and it is probable that this repose enables some of the waste to be repaired. During the summer activity is constant in the hive night and day. Clearly, light and darkness make no difference to the interior.'

2. 'It is universally accepted that the queens can hear each other piping; and one might ask, If the bees cannot hear each other, what possible purpose do the sounds serve?'

3. 'Undoubtedly. Fanning or vibration of wings by standing bees is used for other purposes than ventilation, but that is the principal use of it.' Mr. Mace proceeds to prove this with an array of facts too long for quotation here.

§ 5. See Pages 94 to 96.

Cf. C. R. Osten Sacken *On the Oxen-born Bees of the Ancients* (*Bugonia*) *and their Relation to Eristalis Tenax, a Two-Winged Insect* (Heidelberg, 1894). This very interesting and convincing defence of the drone-fly theory came into my hands too late for use.

APPENDIX B

THE following notes were sent me by Mr. L. E. Upcott, of Marlborough. My own additions to them are enclosed in square brackets.

§ 1. SEE PAGE 3.

A better illustration would be Xen., *De Re Eq.*, x. 4: *καὶ τὰ μὲν σκέλη ὑγρὰ μετεωρίζει*, which is almost exactly 'mollia crura reponit.' *ὑγρὸς* = lissome, supple.

[In the *De Re Equestri* Xenophon uses *ὑγρός* fourteen times.

In vii. 6 and 7 he applies it to the legs of the rider from the knee downwards, and to his body from the hips upwards.

In x. 8-10 he says the bit must be *ὑγρός*, and contrasts it with the *σκληρὸς χαλινός*, or rigid bit.

In x. 15—xi. 2 he applies it again to the legs and body of the horse. The legs of an angry horse are lifted high, but are not *ὑγρά*. The horse whose legs are *ὑγρά* is eulogized thus: *καὶ οἱ θεώμενοι τὸν ἵππον τοιοῦτον ἀποκαλοῦσιν ἐλευθέριόν τε καὶ ἐθελουργὸν καὶ ἱππαστὴν καὶ θυμοειδῆ καὶ σοβαρὸν καὶ ἅμα ἡδύν τε καὶ γοργὸν ἰδεῖν.* The whole passage is an excellent commentary on Virgil's use of 'mollis.']

§ 2. SEE PAGE 6.

Mounting is ordinarily done from the 'near' side. But if you have a spear in the right hand, and are

leading the horse with the left, you must practise mounting from the 'off' side. So Xen. vii. 3. There were two ways of mounting, according as you did or did not use a spear to help in the vault. [ἀπὸ δόρατος ἀναπηδᾶν, Xen., vii. 1.] Of course, the ancients did not use stirrups.

The ancient monuments show horsemen holding a spear, and preparing to mount on the right side. In the frieze of the Parthenon a young man without a spear stands on the left.

§ 3. See Page 8.

In respect of 'gyros dedere' (115), Xenophon gives directions for the use of the πέδη, which is a kind of ἱππασία (*manège*). It should be ἑτερομήκης (oblong) rather than κυκλοτερής (circular) (Xen., vii. 13, 14; *cf.* iii. 5).

§ 4. See Page 8.

Did the ancients use the trot? It is, I fancy, not the natural quick motion of a horse, which is the canter. The trot is a transition from the canter to the walk, and the *continuance* of this movement is due to training. Formerly Frenchmen hardly ever used the trot, and that is partly the reason why riding as a pastime was not common in France. It seems to be an Anglo-Saxon invention.

I believe it is very difficult to make Arabs trot. The Parthenon horses canter.

[Barbs are also poor trotters.]

§ 5. See Page 12.

The Parthenon horses (though the metal bits and reins are gone) show the horse's muzzle drawn tight back to the neck, and the creases of the neck and arch of the head and crest are very marked. This indicates the use

of a very heavy bit, though Xenophon recommends light bits (ix. 9). Two causes were at work: (1) The use of stallions, as clearly shown in the Parthenon marbles; (2) the non-use of stirrups, which give more purchase than the knee.

[In x. 6 Xenophon recommends not less than two bits, of which one must be light and the other heavy. The latter should have τοὺς ἐχίνους ὀξεῖς (sharp points at each end of the bit). These, according to Liddell and Scott, are Virgil's *lupata*, the 'wolf-bit.' Apparently the heavy bit is for training, and may be discarded when the horse will do in a light bit what he has been taught to do in the heavy one.]

§ 6. See Page 19.

For ancient hunting dogs, see the remarkable prick-eared, long-muzzled, large-pawed dogs carved on the Alexander sarcophagus. Were these Molossi? There are many statues of dogs in the Vatican galleries, but restorations always make them suspect in 'points.'

§ 7. See Page 21.

The treatise on hunting is Xenophon's *Cynegetica.* At the end he praises hunting as an antidote to sophistry in a remarkable passage.

§ 8. See Page 21.

I have seen the capture of live red-deer in Savernake Forest by the netting system. The deer are driven into an enclosed glade. Riders hunt the herd until one is selected for capture; he is headed off, and gradually driven down a long lane with a net at the end. This is erected on forked sticks loosely planted in the ground. The stag tries to jump it, carries it away, and so 'bags' himself,

as the poles drop. Then he is held down, and his antlers sawn off; after that he is put in a cart.

The 'driving' of fallow-deer by long ropes with feathers attached is also used, and the same sort of rope serves as a fence to keep deer off any place.

§ 9. See Page 22.

Soiling-pits are necessary for red-deer in the rutting season; you see them in Savernake Forest (see Collyns, *Red-Deer*).

§ 10. See Page 52.

Γαστέρι τύπτουσαι (striking the water with their bellies). It is curious that Aratus was a better observer than Tennyson:

> 'Short swallow-flights of song, that dip
> Their *wings* in tears, and skim away.'
> *In Memoriam*, xlviii.

§ 11. See Page 44.

There is a song to the nightingale in Euripides, *Helena*, 1107 *et seq.*, and one to the halcyon in *Iphigenia in Tauris*, 1089 *et seq.*, both extremely pretty, though they may not add to our knowledge of the birds. In the latter is an allusion to the singing swan. *Cf.* Crashaw's *Music's Duel*.

§ 12. See Page 62.

One year the hedge-bank in the Bath Road from Preshute turning to Upcot was honeycombed by bees. The grass plot in front of Preshute House and the grass bank under the wall were both ruined, the grass being destroyed by the burrowing. One walked to school daily through a perpetual swarm. I never heard of anyone being stung.

Appendix B

[This is the wild bee or sand bee, *Andrena nigroœnea*. It is very like the honey bee, but differs from it in many structural points. The females, which are all fully developed, burrow holes 8 to 10 inches deep. In the *British Bee Journal* of June 15, 1911, a writer complains that thousands of them have taken possession of a large rockery, burrowing under the stones and destroying valuable plants. I have recently seen them on a tennis-lawn.]

§ 13. See Page 65

Hearing depends upon the nature of the organ of hearing—*i.e.*, to what air-vibrations it is susceptible. We can hear big gnats; we cannot hear little ones. We can hear a stone whiz through the air, but the noise which (presumably) our planet makes in its movement [about twenty miles a second] we do not hear. Drop a stone: you do not hear it, nor the circlets it makes in water after the splash, unless they break; yet the wavelets must cause air-waves.

[Some people cannot hear the 'thin shrilling' of a bat and it is said that dogs can hear a whistle too shrill for the human ear.]

§ 14. See Pages 31 and 71.

It is curious that the queen-ant, after the nuptial flight, rubs her wings off against blades of grass before she returns to the nest in the ground. I have observed this myself.

Dante has a pretty simile from the ant:

> 'Così per entro loro schiera bruna
> S'ammusa l'una con l'altra formica,
> Forse a spiár lor via e lor fortuna'

'So through the midst of their brown swarm, ants muzzle each other (= touch their antennae) one with another, perhaps to spy out their way or their fortune' (*Purg.*, xxvi. 34-36).

[Virgil has an ant simile in *Aeneid* iv. 402-407.]

§ 15. See Page 75.

Shakespeare was, I suppose, chiefly interested in the *verse*. And what more exquisitely musical line can you find than —

'The singing masons building roofs of gold'?

He puts the whole passage in the middle of an utterly prosaic and very dull versification of his prose original. And Virgil himself, in the bee simile of *Aeneid* i. 430 *et seq.*, was probably his original here in suggestion.

§ 16. See Page 86.

Lord Avebury, if I remember, put a bee in a glass cylinder closed at one end, and turned the closed end to the light. He blamed the bee for not walking out at the back, but buzzing ever towards the light. An ingenious person suggested: Imagine Lord Avebury hanging to a rope in a mine deep enough to be dark, with the bottom one foot below him; would he let go or climb up?

[See Lubbock, *Ants, Bees, and Wasps*, chap. x., p. 278: 'I put a bee into a bell-glass 18 inches long, and with a mouth $6\frac{1}{2}$ inches wide, turning the closed end to the window; she buzzed about for an hour, when, as there seemed no chance of her getting out, I put her back into the hive. *Two flies, on the contrary, which I put in with her, got out at once.*' The italics are mine.]

In many speculations on Instinct and Intelligence, the question is confused by making man's faculties, and—

what is worse—man's profit, the measure of animal intelligence. A donkey is proverbially stupid, because it has more wit than a horse to resist the trainer. A cat is far cleverer than a dog for its own needs, though a dog is far cleverer to do what man wants. Most philosophers have observed the total helplessness of the human infant. In fact, intelligence seems to me relative to environment. In my library I reckon myself more intelligent than my gardener, but put the two of us on a deserted island, he would bear the palm—at all events, at first. And what about my cook?

§ 17. See Page 90.

'That do *bite*' was a perpetual phrase of a gardener of mine, whether speaking of a wasp or of a nettle sting. It is simply a metaphor.

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