

761
C97

THE
MANIFESTATION OF DISEASE
IN
FOREST TREES.

BY
C. E. CURTIS, F.S.I., F.S.S.

ONE SHILLING.

ALBERT R. MANN
LIBRARY

NEW YORK STATE COLLEGES
OF
AGRICULTURE AND HOME ECONOMICS



AT

CORNELL UNIVERSITY

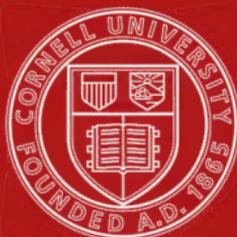
Cornell University Library
SB 761.C97

The manifestation of disease in forest t



3 1924 002 838 450

ma:nn



Cornell University Library

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

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

THE
MANIFESTATION OF DISEASE
IN
FOREST TREES,
THE CAUSES AND REMEDIES.

BY
CHARLES E. CURTIS, F.S.I., F.S.S.

PROFESSOR OF FOREST ECONOMY, FIELD ENGINEERING, AND GENERAL ESTATE
MANAGEMENT AT THE COLLEGE OF AGRICULTURE, DOWNTON, SALISBURY;
MEMBER OF THE AMERICAN ACADEMY OF POLITICAL AND SOCIAL
SCIENCE; CONSULTING FORESTER TO THE RIGHT HONOURABLE LORD
O'NEILL, SHANES CASTLE, ANTRIM, IRELAND; AUTHOR OF
"ESTATE MANAGEMENT" (3rd Edition; *Field Office*);
"PRACTICAL FORESTRY" (Office of *Land Agents' Record*),
"PRINCIPLES OF FORESTRY" (B. A. Society's
Journal), "VALUATION OF PROPERTY" (*Field
Office*), &c., &c.

LONDON:
HORACE COX,
"THE FIELD" OFFICE, BREAM'S BUILDINGS, E.C.

1892.



LONDON :

PRINTED BY HORACE COX, BREAM'S BUILDINGS, E.C.

PREFACE.

THIS short treatise upon the Diseases of Forest Trees requires from me no prefatory remarks. It is addressed to the Landowners of Great Britain and Ireland, in the hope that it may lead to the advancement of Forestry.

CHARLES E. CURTIS.

*26, Gledstanes Road,
West Kensington, W., March 7, 1892.*

THE MANIFESTATION OF DISEASE
IN FOREST TREES,
THE CAUSES AND REMEDIES.



THE term "disease" in its relation to trees is not altogether a happy or correct one, but for the want of a better I accept it. If we take the definition of the word, however, in its restricted sense, namely, the state of a living body in which the natural functions of the organs are interrupted or disturbed, it will be applicable enough. In its more extended sense disease is not found in forest trees. We have in our woodland areas trees in health and trees with health more or less impaired, and the duty of the forester is to detect the presence of disease with a view to

its cure, and so far as possible to prevent it from spreading. Now it must be clear, that before disease can be detected in silent Nature there must be some outward manifestation or indication of its presence ; and if these indications have become apparent to the general observer, or to the uninitiated, it may be safely assumed that a cure is almost impossible. It is, therefore, important that detection should take place before the disease has become so apparent, and this can only be achieved by the trained observer. The future of British Forestry greatly depends upon this power of observation in those who own or manage large tracts of woodland, and it is a power which cannot be taught. It must come, if it comes at all, from that interest and love of tree life which naturally engenders observation. It is strange, but true, that so many experienced and practical foresters do not possess it ; they will work in the woods day after day, year after year, and yet not detect the presence of disease in the trees which surround them. It comes—this power of observation—from the study of Nature, and it

is seldom found in any but those who cultivate some or all of the Natural Sciences.

It is the want of this trained observing power which brings about the serious loss arising from waste in our timber trees. If we walk through areas of woodland we see it all round us, even in well-managed tracts; we see it in ground rot, in broken limbs, in holes in the stems full of water, in overcrowding, in the presence of lichen, in partially uprooted trees, and in the creeping ivy, so dear to those who judge beauty from the artistic standpoint. This waste is silent but insidious, hence the calm indifference manifested; if it were more rampant or more perceptible it would be remedied. Landowners have not now the excuse of inability to fell, for even tenants for life with impeachment of waste may, under statutory powers, fell and sell timber that is ripe and fit for cutting. What we want in our management is to prevent disease, and where we cannot prevent it nor cure it, to fell and dispose of the timber before the disease has attacked the stem itself. But this, I am afraid, is an

ideal. We shall still have to fell grand old oaks rotten at the base or defective above, or elms with nothing but a shell—all of which might have been cured or realised.

We have not, however, uncontrolled power over the trees under our charge. We may do much to prevent disease and much to minimise the loss accruing from it, but we are not infallible.

That man is the best forester who succeeds in bringing to maturity the greatest amount of saleable timber in a given space, with a corresponding natural or artificial reproduction. If we grow and realise timber without maintaining a future supply, we are spending capital, and this is contrary to the true principles of forestry. I am of opinion, and I always endeavour to practise it, that healthy timber until ripe should never be felled, that the moment it is ripe it should be felled to make room for the young beside it; that trees in any way impaired or diseased, wind-lifted, or causing injury to better trees, should be removed. This, however, only indirectly bears upon the subject of disease; let me now

endeavour to deal directly with it, and show (1) how its presence may be detected; (2) the probable causes; (3) the cure; and (4) the prevention; and, lastly, how far the yield of our woodlands may be increased by the introduction of useful conifers hitherto grown for ornament only.

Disease or impaired health may be detected in various ways—by that which is apparent to the passer by, and by that which is apparent only to the trained observer. In the former case we have premature defoliation, the presence of lichen, the dead upper branches, the holes in the stem, the decayed base, and the visible general enfeeblement. In the latter, we have the short and feeble shoots, the undue presence of seed on young trees, the bark-bound condition, the cancerous condition, the presence of insect and fungoid attacks, and the early or late development of leaf. It will be seen that the manifestations are both numerous and apparent, and, as I have stated, the gist of the whole matter lies in the ability to detect these when in an incipient state.

Let us walk through a wood, and through glades and avenues, and follow these manifestations a little more fully before we take the various diseases in detail. Premature defoliation we shall find in crowded plantations, owing to the absence of light and air, and if this is excessive the functions of the organs become affected and the flow of sap becomes disorganised, when probably a hide-bound condition will result. The fall of the green leaf, too, accompanies sometimes various insect attacks.

The presence of lichen is not always serious, even healthy trees we often find in our walk more or less covered, and we pass it by as unimportant ; but when the stem and branches are covered we look upon it with suspicion, especially in the case of larch. This may arise from the presence of stagnant water, and from overcrowding, and may be remedied by drainage or judicious thinning if taken in time. The effect upon the timber if in excess is to render it dry and deficient in strength.

This is almost invariably the result of neglect or bad management.

The dead upper branches or "stag-horn top," as it is usually called (and the name is not inappropriate), is often met with, and is a sure indication of disease in the stem itself. There is no cure for this, but life may be prolonged by drastic measures if it is important from an ornamental point of view. In hardwood trees, such as the oak, the injury to the stem is slow and many years may elapse before any serious defect is seen, but in the case of the soft woods, such as the lime, the effect upon the stem is rapid, in fact, it is often accompanied by a decayed base, but of this anon.

Then we find holes large and small where branches have died or been cut off, where birds build their nests. At the base of these we have dampness, often water, and this percolates through the stem and causes untold waste. Only a little while ago I felled a large oak, and found that where a large hole had been caused by the breaking off of a limb, the water had penetrated, percolated through the heart-wood, and rendered the tree comparatively useless. This in the case of a soft wood such as the

lime would have rendered the tree perfectly hollow.

This evil may be prevented by the sawing off of broken limbs, and be cured, if not too advanced, by plugging. The decayed base, too, we find in many of our woods, and we find it both in dry and wet land; this is probably owing to injudicious selection of trees in young plantations, or to full maturity in the case of older timber trees. This deserves, however, a more minute treatment hereafter.

Then we come to those indications which are not so apparent. Now, the general observer is satisfied if he sees the trees throw out their young twigs and branches when the spring opens, and he seldom follows with any interest the growth which succeeds; but to the intelligent forester this is important. A tree in robust health will throw out shoots from eight inches to thirty-six inches in the season, according to its kind. If less than eight inches it would imply some derangement, but the implication would by no means be conclusive. The observer before he can

judge must be acquainted with the growth of the previous year or years, and if there is a sudden cessation of growth, not accounted for by the season, it may be taken as a sure indication of incipient disease. This is perhaps one of the most important considerations, and I recommend foresters to observe it.

Another indication we shall undoubtedly find, especially where there are conifers, is the presence of seed on young trees. I have never found this fail; for, in the case of conifers, where the cones have been very numerous, death or impaired health has invariably followed. Nature seems anxious to propagate her species before life becomes extinct—at least it would seem so in such a case as this. Here, too, we learn a lesson as to the collection of seed for nursery purposes, to select those from healthy and mature trees rather than these which the true forester will avoid.

Other trees we find in a bark-bound condition, that is, the bark is tight and grasps the wood so that the circulation of sap is checked and the cells crushed and disor-

ganised. This may arise from the evils already set forth, or from injudicious thinning; in some cases there is a cure, but prevention is better.

Then as we proceed the close observer will detect insect and fungoid pests, and here he will find that nature will often elude the most vigilant watchfulness. Plantations in full health to-day may be attacked and hopelessly destroyed to-morrow. He may combat the attack sometimes if circumscribed in area, but if widespread and sudden he can do but little.

Let me now enumerate and describe some of the most important diseases to which our forest trees are liable; and as Larch disease or canker has a wider range than any other, and is attended with the most serious results, I will take it first.

LARCH DISEASE.

Larch (*Larix Europea*) is, as all know, not a native of Great Britain, and is therefore liable to diseases which our one native conifer, the Scotch pine, almost invariably escapes. It

is a native of the northern slopes of the Alps and Apennines where it attains great height and girth, and the timber is most valuable. In this country, however, where it has been cultivated with great success, it only attains great dimensions in favourable sites and soils. It is a native of bright skies and a clear atmosphere, and under our cloudy skies and dull atmosphere its vitality is more sluggish, hence its predisposition to disease. As a conifer it undoubtedly forms the most important tree in our plantations, especially when the soil and site have been well chosen, or where the tree has been judiciously selected. Here it grows rapidly, and yields in a few years a quantity of timber to the acre which is surpassed by no other tree of its kind.

All will agree that if the larch will grow well no other tree should be selected where an early return is desired; but there are many soils and many situations where the larch will not grow well, and where it is folly and waste to plant it, and yet acres and acres are planted year by year without thought or

reason. It is supposed to be catholic in its tastes, but it is not so. The forester, as a rule, has to plant areas unfitted for ordinary purposes of cultivation and unprepared by husbandry, soils with little or no available organic matter, and failure is not to be wondered at, but success should often be looked upon with some surprise. Take the poor thin soils of the chalk or the dry sands of the Lower Greensand, or the Bagshot sands, and such like, where we find large areas of larch struggling against disease and coming to a premature maturity. It is on such soils as these that we find the canker.

Then take the bog-land of Ireland, where we find the Scotch pine, the silver fir, and the spruce outstrip the larch, the latter becoming at an early age a prey to the worst form of the disease, and where the ground is a little drier but low-lying they struggle into age but yield a dry and valueless timber. I could point to plantations on a low-lying tract in Ireland, perhaps twenty years old, where every tree is cankered; and to plantations on the thin soils of the chalk where it is

equally apparent, showing that the effects are the same whether it arises from drought or excessive moisture. This, however, is not the only cause. The larch throws out its shoots of tender green early in the season, and the late frosts are apt to injure these and disorganise the plant. Again, we find it in overcrowded plantations, where thinning has not taken place, and where three feet planting has been adopted; there is no light, no air, the bark remains moist and becomes a fit habitation for the spores of the parasitic fungus known as the *Peziza Wilkommii*. These spores are always more or less floating about, and fall in due course upon the young tender and living bark of the larch trees. Finding the moisture and the dull light favourable to germination they germinate, throw down their mycelium, feed upon the juices of the tree, live for a while in their perfect beauty, and throw off a fresh batch of spores. In the meantime canker follows, and the trees are either destroyed or enfeebled. Now, it is believed that this beautiful little peziza is the cause of canker in larch; true, I have found

the two together, but I have also found canker where I have failed to discover the fungus.

From my own observation I have found the fungus upon the upper portion of young trees—not on old trees, nor on bark above three or four years of age; immediately beneath the fungus the bark is dead, that surrounding it being green and full of life when cut with a knife; below and to the base, including the branches, are the black blotches which eventually become cancerous. These throw out globules of clear turpentine, extend, open into sores, and form cavities which rapidly increase as the growth of wood proceeds. This is not a new disease, but one to which the larch is liable to some extent in its native land; but there it is hardly looked upon as a disease, but is made use of where found for the collection of Venice turpentine, the cavities being tapped for the purpose.

I have myself found, in large trees which were badly cankered when young, deep-seated cells or cavities the size of an egg filled with this beautiful fluid.

It must not be implied from the foregoing remarks that this disease is found only in neglected, over-crowded, and ill-chosen plantations; it is found in healthy and carefully thinned plantations, and where the soil and site are in every respect suitable to the tree, and I have myself verified this; but in a case of this sort, there is no blame—no action on the part of the forester could have prevented it, no foresight could have controlled it. In such instances, the trees may after a while recover, though the timber in after years may be somewhat faulty and defective.

It is somewhat strange, but in more than one instance when I have been microscopically investigating the canker, and examining the fungus, I have found evident traces of an attack of the *Chermes laricis*, larch bug, or aphid. The evidence has been in the discovery of the eggs on their hair-like stalk situated at the base of the leaf-knots. In these cases the whole of the upper portion of the young trees have been dead, as if the vital fluid had been sucked away by the host of aphidæ which attacked them. The attack may continue

from April to August, both larvæ and the fully developed winged and wingless insects piercing the bark and living upon the juices during that whole period. The last laid eggs produce the "Mother Chermes," the founder of the next generation. (Those desirous of fuller information should consult the excellent work of Miss Ormerod, to whom all land-owners are deeply indebted.) Now, on these dead leaders I have found no peziza, showing its parasitic nature in not germinating upon dead bark, but immediately below on the live bark specimens have been numerous.

Whether, owing to the attack of the chermes, the plant has become enfeebled and induced a predisposition to canker, or whether it is the reverse, that the attack of the fungus has enfeebled the plant and rendered the sap more palatable to the chermes, is a matter I cannot pronounce upon with any certainty, but I am led to believe that in every case I have examined, the cancerous attack is earlier in date than that of the chermes. However, these attacks are not always coincident. I look upon the cases I have named as unusual

and arising from the fact that the aphidæ were in these years very active and destructive.

Now, little good will arise from a discussion of the cause and effect of this or any other disease without it is accompanied by some advice or recommendation as to the prevention or cure. I offer this with diffidence, but as it is based entirely on my own observation, I have hope that it may prove of service to those who have to combat with the mischief. The first and most important advice is, give up the system of indiscriminate planting of larch, and plant those trees which will grow in its place. For example, on sands plant Scotch or Austrian pines, or the pinaster, and on low-lying moist lands, where the bottom is cold and where fogs lie morning and evening, plant Scotch pine, silver fir, or spruce. This advice may be refused by some, especially in the case of the Scotch pine, but I have known these trees do well where the soil is not too stiff, and where there is no stagnant water, and at any rate there will be no disease without it is late in life.

On soils which appear suitable for the growth of larch, and yet the larch does not thrive, try the *Pinus laricio*, or Corsican pine. This is a tree worthy of a place in our woodlands; it is catholic in its tastes, it is hardy, grows rapidly, and yields a coarse but useful timber, and is seldom attacked by ground game. Let it be fairly tried, and I think it will surpass the Scotch.

Again, on sandy loams, fairly sheltered, with a porous subsoil, grow the *Pseudosuga Douglasii* or Douglas fir. This tree should be more fully grown, it is worthy of a trial. My own experience points to double or treble the amount of timber in a given time to that of the Scotch pine, silver fir, or larch. The timber, too, is excellent in quality. I have many of these under my management, and in every case they have left the other conifers, planted among them at the same time, far behind. Where there is doubt in the matter of larch, mix them with other trees such as I have named, so that if one crop fails you can fall back upon the other.

Then, as to prevention and cure, the only

methods I can suggest are to drain if needed, to plant not less than four feet apart, to select the best trees, and to thin judiciously as soon as lateral contact takes place. But I have more faith in the prevention than the cure.

The following observation may tend to throw a little light on the subject of soil and aspect as regards larch. I have invariably found that the finest trees, the best timber, and the greatest freedom from disease are to be found upon hill or mountain slopes where there is a dry soil with free percolation of water, and with a northern aspect. On flat low-lying land the trees are usually infested with lichen if not interspersed with other trees.

In my own experience I have found but little disease among other coniferous trees. There is among the acclimatised varieties a tendency to weakness, a tendency to bear seed at too early an age, and a certain obstinacy for the first few years; but I have invariably found them respond to judicious treatment. My treatment in the case of

ornamental trees has been to feed occasionally by digging a trench with a prong round the tree at the extremity of the lower branches, about two feet wide and two or three feet deep, and filling this trench with leaf-compost. This has been invariably attended with a vigorous growth and complete re-invigoration; any tendency to disease or decay has been eradicated.

When there is a tendency to throw out shoots early in the spring, as we find in the silver firs, it is well to check it, as otherwise they will be destroyed by the late frosts, and the growth and health of the tree will be affected. This may be done by cutting off a few of the leading roots in March or April just before the buds expand. This will not injure the tree, but will retard development until there is no fear of injury. The effect of late frosts upon the young and unripened shoots is often very marked in the case of horse-chestnuts.

I will now pass on to the disease known as the

STAG-HORN TOP.

We need go no further than Kensington Gardens for an illustration of this indication of disease. It is here more marked than in any other district that I have visited. It is both destructive and unsightly, and should receive the close attention of those who have the management of woods. The manifestation needs but little remark, for it is apparent to all. The top branches die, the yearly growth is meagre, and the whole tree presents an enfeebled condition. On oaks the effect is slow, and the branches die without any visible injury to the timber. But the oak under all conditions takes a long time to die. Dryden's verse upon this subject shows that he possessed an observing eye, for it will be remembered that he gave three centuries as the period of decay.

This is not the case with the soft woods. Take the lime as an example. Here the effect upon the stem is probably co-existent with that of the branches. It will be found that the base of the tree is rotten, probably the

heart wood will have become completely decayed, leaving nothing but a tube, and the branches will fall to pieces in the hand when touched.

Many causes lead to this, but the chief are inadaptability of the tree to the soil and the aspect, to a wet and cold bottom, dry surface soil, over-crowding when young, thereby reducing the foliage radius and ramification of root fibre (which, observers will know, correspond with each other), to the sweeping away of the fallen leaf, and the close cutting of grass. Another cause, not belonging to this series at all, is that of noxious fumes. Look in the neighbourhood of brickfields, or where the trees are exposed to the smoke of large cities, or to the neighbourhood of large manufacturing towns, here it is seen in all its ugliness.

Take limes growing upon exposed sites, on a wet, cold clay bottom, and possibly a dry sandy surface, and we find the tree altogether out of its natural habitat, which is a sheltered position, a loamy soil, and porous subsoil. Where this is accompanied by limited foliage

and meagre root fibre, impaired health must be expected, and the probable manifestation of it will be the "stag-horn top." On the Bagshot beds, which to a limited extent overlie the London clay in Middlesex, we find the fine brown sands with thin layers of clay and gravel and an impervious yellow and bluish clay subsoil. It is usually wet and boggy on account of the free percolation of water through the upper soil and its retention below. Here the disease is most rampant, for the trees suffer from excessive wet in the winter months and from surface dryness in the summer.

It may be said that all our deciduous trees are subject to this disease when enfeeblement arises, but, although the conifers suffer too under like circumstances, I have always found a reverse effect; that is, they, instead of dying from the top, die from the bottom. I had occasion some time ago to hold a post-mortem upon an *Araucaria imbricata*, the Chili pine, planted in 1851 to commemorate the great exhibition of that year. A section of this tree is now on view in the Herbarium

of the Natural History Museum in Cromwell-road. It was growing upon such a soil as I have named within the London series, and grew well up to a year or two before it was cut down. The lower branches died, whorl after whorl died off, the top of the tree retaining its vitality to the end. The surface soil was perfectly dry, too dry; the subsoil two and a half feet below was a wet, cold, yellow clay. The tap-root was three feet long, and intact, but dead; the roots and root-fibre were close on the surface and were dried up. Here are two causes which admit of no contradiction, viz. : a cold wet bottom and dry surface, attended by an insufficiency of plant food; the leaves having been carefully swept away and the grass-cutting machine used for many years. How often we find a failure of tree life on lawns and pleasure grounds not noticeable upon grass and park lands, owing entirely to this fact, that the trees for the sake of tidiness have been deprived of their natural food and surface moisture. In this case, too, the tree was planted in a soil which did not correspond

with its natural requirements, which are a moist soil not wet in the bottom.

With regard to cure, there is none for this disease; true, life may be prolonged by pollarding and pruning, but only at the expense of beauty. With great care in pruning, so as to retain the natural shape, a tree may be allowed to remain a few years, but, as a rule, I recommend the drastic remedy of cutting down.

The best method to adopt is prevention. When the disease is prevalent, let means be adopted to prevent its recurrence in the case of newly planted trees. Drain, plant trees adapted to the soil and site, give them room to develop foliage and root-fibre, and leave them their natural diet of fallen leaves. It may not be out of place to mention an instance as showing the necessity of this. Some time ago, when called in to investigate a case of disease, I found the trees upon the lawn showing every indication of disease, when trees of like nature and size, growing close by in the park, were perfectly healthy.

Much loss arises from this "stag-horn

top," and I have, therefore, laid some stress upon it. It is avoidable, but not curable.

BARK DISEASES.

Diseases of the bark may arise from manifold causes, from the growth of epicormic branches, induced by injudicious thinning, wounds, ivy, wet and cold sub-soil, frost, and insect attack; the result may be excrescences, a bark-bound condition, the separation of the bark from the wood, and various other manifestations. From whatever cause it arises, the "cambium," or formative fluid, which flows between the inner bark and "alburnum," or sap-wood, is retarded and does not reach the leaves in sufficient quantities, and, therefore, is insufficiently elaborated. This engenders disease, which, if allowed to go on unchecked, will end in the destruction of the tree.

The epicormic branches, that is the branches growing from the stem, increase the tendency to disease, through the interception of the sap as it passes, thereby reducing the quantity which is required to reach the leaf surface.

These are always evident upon hard woods, after the thinning of woods and plantations, especially when the thinning has been delayed or is excessive. There is of course in this case a lowering of the temperature and a consequent interruption of the flow of sap; and to prevent mischief, these branches should be pruned off with a chisel on a long handle, with an upward stroke, to avoid wounding the bark. This may have to be repeated year by year for a while, but the result will well repay the expense.

Wounds should be avoided as much as possible, as these result in the killing of the sap wood round the part, the lodgment of water in the cavity caused, and, if neglected, an injury to the heart wood itself.

Ivy, after a while, has an injurious effect upon the bark, by the exclusion of light, air, and moisture, and through its crushing or squeezing power. It should always be cut through near the ground whenever seen. It will die on the tree and soon cease to cling or exclude light and air. When very old and the tree has been already impaired in health,

it is too late, and it may as well be left for ornament.

A wet cold bottom affects seriously the health of young trees, and the result is often a binding of the bark. Frosts, too, often have the same effect. It is apparent by the feebleness of the new branches and the stunted growth, and by a tight look about the bark. The bark is strained and has often a polished appearance, and the longitudinal fissures or clefts seen upon active bark are not present. These fissures are due to the expansion of the bark by growth of wood, and the presence of these is a sure sign of growth. Those trees, too, like the planes and maples which show health by flaking or scaling of the bark, cease to scale when in this condition.

Look, for example, at the Oriental and Western planes in the autumn, how apparent this scaling is, how yellow and green the blotched surface is when the trees are in health, and how gnarled and compressed the epidermis is when the trees become hide-bound.

This may be cured, but it is better to prevent it by inducing growth by culture and care. The cure may be effected by drainage when the soil is wet, by cutting through the outer bark longitudinally with a sharp knife, by keeping the bark moist by compost or hay bands kept wet, and by scraping off the outer bark.

INSECT ATTACK.

Another cause is that of insect attack, which often, indirectly perhaps, renders the bark inactive, but this will be considered under the head of insects which injure forest trees. Among these are the ash bark beetle (*Hylesinus fraxini*), ash bark scale (*Chionaspis fraxini*), elm bark beetle (*Scolytus destructor*), goat moth (*Cossus ligniperda*), buff tip moth (*Pygera bucephala*), cockchafer (*Melolontha vulgaris*), marble gall fly (*Cynips Kollari*), oak leaf roller moth (*Tortrix viridana*), pine beetle (*Hylurgus piniperda*), pine saw fly (*Lophyrus pini*), pine weevil (*Hylobius abietis*), spruce gall aphid (*Chermes abietis*). These insect pests attack the trees

either in their wood, bark, branches, or leaves, and by reducing the vigour of the plant predispose it to disease and decay.

It is not my intention to dwell minutely upon these individual pests, for a knowledge of forest entomology, though deeply interesting, cannot be followed far in such limited space.

As a rule insect attack is favoured and controlled by atmospheric influences, and the forester has but little control over it, nevertheless if he knows from what source and under what conditions the attack may be expected he may exert such influence as lies within his means. How many of us have noted the white wool-like substance upon the young leaves and stems of the larch (indicative of the presence of aphidæ), the perforation of the leaves of the limes, the destruction of the leaves of the oak, the black fungoid spots upon the leaves of the sycamores and maples, and the diseased state of the bark, without giving a thought to the cause! Here again the trained observer will score a point on the non-observer or careless forester.

Let us deal with them briefly in the order given :

The Ash-bark Beetle is injurious, both in the beetle and grub state. These attack the inside of the bark and bore to some extent into the wood itself, leaving the roads or galleries which the forester knows so well, the leading or main road with its galleries perpendicular to it. Miss Ormerod, in her careful investigations, considers that they are attracted by the newly felled ash trunks, in which they propagate, and from which their new broods pass to the growing trees. The attack, like many others, seems to be concentrated upon the delicate or semi-decayed trees, which again points to the necessity of keeping a wood or plantation in a healthy state by good culture. The injury arises from the separation of the bark from the wood, and from the holes caused by the escape of the beetles after development, which absorb water and hasten decay.

The prevention and remedy lies in the cutting away of dead or dying trees, the promotion of growth of those which are in

health, and in the burning of all dead wood and *débris* which it is known attracts the beetles.

There are remedies in the case of isolated trees being attacked, but in a large wood they are beyond the power of the forester. It will be well when ash timber is felled to remove it during the winter from the wood.

The Ash-bark Scale insect attacks the bark of ash trees. The attack is usually confined to the young and soft bark; this it pierces with its sucker, and causes injury by the extraction of the juices and by the perforation of the bark. The scales contain the female and eggs, the former being a fleshy, shapeless mass, the latter being crimson in colour, and containing the young scales.

Its presence is indicative of a constringent state of the bark, brought about by ungenial soil or undue wetness. If this is the ruling cause, there is little prospect of a cure; but, if the constringency arises from too sudden thinning, the bark may be scraped or

relaxed in some other way, when probably the scale will depart.

The Elm-bark Beetle, in its attack, is somewhat similar to the Ash-bark Beetle already described. It is no doubt in its effect well-known to all frequenters of woods and timber yards. The borings take place between the soft inner bark and the alburnum. Their presence may be detected in June by the wood-dust caused by the boring of the insect when seeking entrance for the laying of its eggs; these eggs, from about a hundred in number, are laid along the side of the burrow. The young grubs work at right angles to the original burrow, the burrow growing larger as the grub proceeds, on account of its increased size. At the end it becomes a pupa, and when fully developed pierces its way through and leaves the tree, this usually taking place in the month of August. In this case again is evidence of the necessity of health to resist attack, for it is chiefly confined to trees in an impaired state of health.

The prevention of this lies mainly in the

maintenance of health, and the felling of decayed trees ; also in the barking of felled trees, or their complete and early removal, and the burning of all bark and dead matter.

This leads me to draw the attention of those who have the management of woodland to the necessity of enforcing the removal of all timber sold previous to the first day of April in every year. The evil practice of allowing timber to lie for an unlimited period after the sale should be in every way discouraged.

The Goat Moth causes serious loss, but, fortunately, it is not, as a rule, widespread in its attack. The moth lays her eggs in the bark crevices, and the caterpillars eat their way through the bark into the wood, where they live and feed for a period of three years. They bore large holes into the wood, thereby destroying the tree from a timber point of view. There are, of course, remedies open to the entomologist in the case of isolated trees, but, on a large scale, little can be done. One thing is essential, however, and that is, that every tree

attacked, when found, should be cut down and the grubs destroyed. The round holes, often seen in trees, are caused to a large extent by this pest, enlarged by the woodpecker in search of the grub.

The Buff-tip Moth feeds chiefly on the leaves of the lime, elm, and oak, often causing serious injury.

The eggs are deposited upon the upper surface of the leaves in batches of thirty and upwards.

The caterpillars hatch in the course of a fortnight, and feed upon the upper surface and edges of the leaves, and if the attack continues, as it often does, until the autumn, very little foliage is left. When full fed the caterpillars come down and bury themselves beneath the soil, and the perfect insect emerges in the following June.

The only remedy, or, rather, the only means of lessening the attack, is to knock the caterpillars off the branches in any manner that can be arranged. They may be destroyed when on the ground either in the chrysalis or caterpillar stage, which will of course

lessen the attack the following year. Injury done to the foliage at the most important season of the year is likely to engender disease in the tree.

The Cockchafer does harm both in its larval and perfect state ; in the former it feeds upon the roots of young trees, and in the latter it feeds upon the leaves. The injury that it does, however, is not often so marked as many others, and it is only when the tree shows signs of dying that attention is attracted to the presence of the grubs. This is chiefly because the attack is confined to the roots, and is therefore out of sight. Steps, however, should be taken to destroy both the grub and perfect insect whenever possible.

A good plan, too, is to encourage wild birds who feed upon them to a large extent.

The Marble Gall Fly is well known to us through the marble-like galls which we find upon the oaks, both tree and coppice oak.

There are many kinds of galls we are informed by Miss Ormerod—galls which attack the leaves, the buds, the bark, the

roots, and the acorns, but of these we have not to do.

These gall flies belong to the order *Hymenoptera*, and are provided with a peculiar egg-laying apparatus, with which they are enabled to pierce and eject fluid into the part of the tree chosen for attack. This sets up an irritation in the tissues, which results in the galls so well known to frequenters of our woods and glades. If the gall shows no perforation it may be taken for granted that the grub is in the centre of it, therefore if these are destroyed the grub will be also. The fly usually, however, comes out in the autumn, so that the collection and destruction of the galls, if resorted to, should take place early in the summer.

The Oak Leaf Roller Moth is an insect which causes great injury to our oak woods and plantations by depriving the trees of their leaves in the early season, thereby materially affecting the health of the tree and the development of timber. Most of us have noticed this in the south of England, especially in some years when the caterpillars

have been numerous. Whole districts and whole woods are sometimes stripped bare of leaves, so as to give an appearance of winter. The eggs are laid in the summer or autumn of the year preceding the attack on or in the leaf-buds; the caterpillars hatch in the spring, and at once commence to feed upon the leaves. When full fed they have the power of rolling up the extremities of the leaves and spinning them together with a silky thread in which they turn to chrysalids; before this takes place, however, they sometimes leave their case and hang down by a silk-like thread, drawing themselves back again at will. The moth appears about the end of June.

The attack is accompanied by no previous visible signs, so that it is quite impossible to combat it.

The best method, and perhaps it is the only one, is to encourage, so far as possible, the insectivorous birds.

The Pine Beetles, like other boring pests, commence their life in a tunnel between the inner bark and the young wood. Here the

eggs are laid, and when hatched the larvæ eat their way at right angles to it, and eventually bore their way out. Decayed trees are usually chosen, and this once more impresses upon us the necessity of cutting and ridding the woods of all dead and dying trees and *débris*. It is not here, however, that the chief mischief takes place. The perfect beetle feeds upon the tender shoots by boring into them and along the course of the pith. This is done in the summer, and in the following spring these become detached by wind, thereby lessening the leaf surface of the trees. So long as it is confined to the lateral branches, the ill-effects are not so apparent, but unfortunately they prefer the leading shoot, and when this is the case the growth of the tree is materially affected, and the symmetry of the tree destroyed. Nature will often adapt one of the lateral branches, so forming a new leader, but not without some injury to the tree in the meanwhile.

The remedy here lies, as stated, in the careful destruction by fire of all pine rubbish and decayed or decaying wood.

The Pine Sawfly is a very destructive one to young plantations of Scotch pine. They feed upon the leaves, and when one tree has been stripped they pass on *en masse* to another, and their depredations sometimes extend over very large areas. The sawfly appears in early summer, and the eggs are deposited in the pine-leaves by the saw-like ovipositor; these the female covers with a resinous substance. In about three weeks the caterpillars hatch, and feed upon the tree for about two months, when they enter the moss and leaves at the foot of the tree and form their cocoons; these are about one inch long, and when in this state they may be raked together and destroyed by burning. They sometimes remain a long while in the cocoons, but eventually the perfect insects appear in the summer.

The remedy lies in the destruction of the pest in one or other of its forms. The caterpillars may be shaken off the trees and destroyed below, or the cocoons, as stated, may be raked together and burnt.

The Pine Weevil attacks all the coniferous

trees by feeding upon the tender bark of the young shoots. It is most destructive in young plantations planted after a ripe crop has been removed. Its chief breeding-places are bare spaces in the woods among the dead *débris*, old stumps, rotting bark, and other decaying matter ; and if this is carefully destroyed after each successive thinning the destruction will be minimised, if not altogether prevented.

Finally we come to the Spruce-Gall Aphis ; this is similar in some respects to the Larch Aphis. The mother cherm attacks the ends of the shoots of the spruce fir, and in the early spring it may be found with the sucker inserted in the base of the bud ; this gives rise to the peculiar *pseudo* cone so often seen.

When the young trees are much infested, the galls should be collected and destroyed ; and, if this is impossible, all the trees should be cut and burned. Here the only means of prevention are careful culture and prompt destruction of *débris* whenever thinning or cutting of any kind takes place.

At the risk of repetition I would impress upon all foresters the necessity of cleaning up after every fall of timber, and the total destruction by fire of all dead organic matter. It is a plan I invariably adopt, and if I cannot achieve it at once I do so not later than the following season, when the bare spaces are planted up.

Another cause over which the forester has control is that arising from the growth of trees from stools. There are of course cases when "tellers" must be left to fill up spaces not occupied by "maiden" trees or "heirs;" but this practice should never be resorted to if it can be avoided. If it is, care should be taken to select young and small stools, so that there may be a possibility of the stem *englobing* the stool; if it does not, the probability is that the base will decay and the future tree be of little value. I have in my practice invariably found this to be the case when "tellers" are left indiscriminately.

Before concluding this subject of disease in trees it will be well to offer a few sugges-

tions upon the re-invigoration of old trees, whether conifers or hard woods. This is recommended only in the case of specimen or ornamental trees, and not for the more rapid growth of the tree for purely commercial purposes.

That it can be done is a fact and not a mere expression of an unproved theory.

When such trees show signs of a feeble vitality the stems, if covered with moss and lichen, may be scraped and washed, taking care of course not to injure the inner bark. The soil round the base of the tree, at a distance equal to the spread of the reduced branches, should be dug out and thrown aside, say three feet wide and from two to four feet deep, according to the dimensions of the tree, but so as to expose all the lateral root-fibre. The top soil may be retained for mixing with a leaf compost, and the whole of the trench should be filled up with this mixture. If the roots spread beyond the branches after cutting back, they may also be cut. New root-fibre will be speedily formed in the leaf compost, and the result

will be visible the year after in increased foliage.

In the case of hard woods the branches should be shortened, taking care to maintain the symmetry of the tree ; in conifers, of course, this must be avoided. It is important to remember that a branch on the under side of the bough should be left where the cut takes place. If left upon the upper side, an upright growth takes place, which destroys the shape and beauty of the tree.

Care should be taken to avoid injury to the terminal shoots of the lower branches of conifers by contact with the mowing machine. The neglect of this precaution often completely defeats the object of the planter.

In conclusion, there is ample room for the spread of knowledge in respect of tree diseases, and if landowners would study the manifestations and causes, and endeavour to remedy or prevent the spread of the maladies, great profit would accrue to them. This can best be done by cultivating the perceptive powers. There are some who never will see what is clear to others, and it usually arises

from a spirit of indifference or want of sympathy.

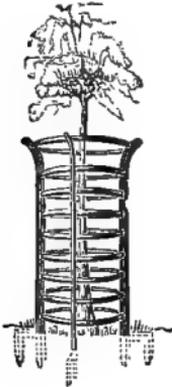
The poet Wordsworth expresses this so beautifully that I cannot close my subject better than by quoting his lines in which he describes Peter Bell's lack of sympathy with the beauty of Nature :

“ A primrose by a river's brim,
A yellow primrose was to him,
And it was nothing more.”



HILL & SMITH'S Strong Wrought-Iron Tree Guards.

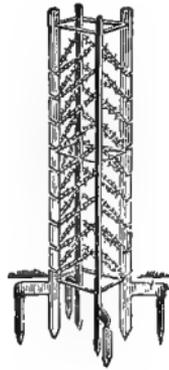
Pattern No. 1.



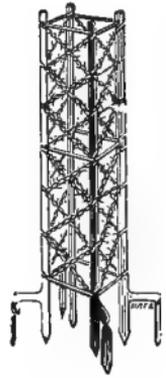
Pattern No. 2.



Pattern B.



Pattern C.



Nos. 1 and 2 patterns are made with flat and round rings of iron respectively. In the latter the rings are arranged to present a spiral appearance.

Patterns B and C belong to the "Porcupine" series of guards; they are 6 feet high by 12 inches square, and are very simple in construction, being composed of ordinary uprights, with double-pronged feet, and three stay pieces; and for the horizontal bars, thick-set, steel-barbed wire is substituted, firmly secured to the uprights.

All these guards are made in halves, to bolt together, and are easily fixed or removed at any time.

LIST OF PRICES.

	At Works.	In London.	In Glasgow or Dublin.
Pattern No. 1.—5ft. high, 2½ft. diam. ... each	12/6	14/-	15/-
" " 2.—6ft. high, 2½ft. diam. ... "	14/6	16/6	17/-
" B. "	9/-	10/-	10/6
" C. "	10/6	11/6	12/-

HILL & SMITH,
BRIERLEY HILL IRON WORKS,
NEAR DUDLEY.

London Office: 118, QUEEN VICTORIA STREET, E.C.



FOREST TREES.



One of the Largest Stocks in Britain, superior, hardy, robust growths, and well rooted, safe for removal to any part of the country.

ESTIMATES GIVEN FOR FOREST PLANTING IN ANY DISTRICT.

Old Forests reported upon, and every information given in Estate Work generally.

CATALOGUES FREE.

LITTLE & BALLANTYNE,
THE ROYAL NURSERIES, CARLISLE.

HARDILY-GROWN

TREES, SEEDS, PLANTS, BULBS, &C.

STOCKS QUITE UNEQUALLED FOR
SUPERIOR QUALITY,
IMMENSE VARIETY,
& GREAT EXTENT.

INSPECTION EARNESTLY INVITED.

PRICED DESCRIPTIVE CATALOGUES POST FREE.

DICKSONS
NURSERIES

(400 ACRES),

CHESTER.

ONLY BRANCHES { NEWTOWN Nurseries, Montgomeryshire.
DOLGELLEY Nurseries, Merionethshire.
PWLLELI Nurseries, Carnarvonshire.

1892.

A

CATALOGUE OF BOOKS

RELATING TO

Angling, Boating, Cricket, Farming, Gardening, Hunting,
Shooting, Tennis, Travel, Yachting, &c.,

USEFUL FOR

COUNTRY GENTLEMEN,
TRAVELLERS, ETC.,

PUBLISHED BY

HORACE COX,

“THE FIELD” OFFICE, BREAM’S BUILDINGS,
LONDON, E.C.

**.* Orders for any of the following works, with postage stamps or post-office order (payable at the Money Order Office, Chancery-lane, W.C.) for the amount, should be sent to HORACE COX, Publisher, at the above address, or they may be obtained by order of any bookseller.*

AGENTS.

IN AUSTRALIA:—E. A. PETHERICK & Co., 333, George-street, Sydney, and 380 and 382, Bourke-street, Melbourne, Victoria; W. C. RIGBY, 74, King William-street, Adelaide, South Australia.

IN INDIA:—THACKER & Co., Limited, Bombay; THACKER, SPINK, & Co., Calcutta.

IN CANADA:—GRAFTON & SONS, Montreal.

NOTICE.

THE attention of Country Gentlemen, Travellers, Sportsmen, Farmers, and others is called to the works quoted in this Catalogue. Each volume is written by an author who is well known and an acknowledged authority on the respective subject.

The illustrations have been intrusted to competent artists, and neither pains nor expense have been spared to make the works as complete as possible.

HORACE COX,

Publisher.

A
CATALOGUE OF BOOKS

PUBLISHED BY
HORACE COX.

Second Edition, Greatly Enlarged.

Royal 4to., bevelled boards, gilt edges, price 15s., by post 15s. 9d.

PHEASANTS:

THEIR

NATURAL HISTORY AND PRACTICAL MANAGEMENT.

BY

W. B. TEGETMEIER, F.Z.S.,

(Member of the British Ornithologists' Union.)

AUTHOR OF "THE NATURAL HISTORY OF THE CRANES," &C., &C.

Illustrated with numerous full-page engravings drawn from Life by T. W. WOOD.

DAY'S SALMONIDÆ.

In one volume, imperial 8vo., cloth, price One Guinea, by post 21s. 6d.

With Twelve Coloured Plates and many Woodcuts.

BRITISH AND IRISH
SALMONIDÆ.

By FRANCIS DAY, C.I.E., F.L.S., and F.Z.S.

This work is an exhaustive treatise on the Salmonidæ of the British Islands, and will be interesting to the fisherman, as well as a text-book to the scientific ichthyologist. The reduced price will place it within the reach of all.

A few Copies to be had, beautifully bound in Whole Calf, Full Gilt, price 35s.

*Just published, demy 8vo., with Illustrations, price 2s. 6d.,
by post 2s. 9d.*

POULTRY

FOR THE

TABLE AND MARKET

VERSUS

FANCY FOWLS,

WITH AN EXPOSITION OF THE

FALLACIES OF POULTRY FARMING.

"As the result of my experience of nearly half a century I do not hesitate to affirm that no one breed of fowls has been taken in hand by the fancier that has not been seriously depreciated as a useful variety of poultry."—*Vide page 1.*

By W. B. TEGETMEIER, F.Z.S.

Author of "Profitable Poultry;" "The Poultry Book;" "Poultry" in the "Encyclopædia Britannica;" "The Modern Breeds of Poultry," in "The Ibis," 1890; "Farm Poultry," in the Journals of Royal Agricultural Society, 1890, the Bath and West of England Society, and the Yorkshire Agricultural Society. Editor of the Poultry Department of "The Field;" Davis Lecturer to the Zoological Society; Lecturer to the Agricultural Institute, South Kensington Museum; one of the Judges at the Royal Agricultural, Bath and West of England, the Birmingham, Crystal Palace, Dairy Show, and other Exhibitions.

CONTENTS.

CHAP.	CHAP.
I.—Introductory.	XII.—Feeding.
II.—Game Fowls.	XIII.—Hatching.
III.—Dorking.	XIV.—Bearing the Chicken.
IV.—Cochins.	XV.—Breeding for the Market—Eggs.
V.—Brahmas.	XVI.—Breeding for the Market— Chickens.
VI.—Langshans, Plymouth Rocks, and Wyandottes.	XVII.—Fattening.
VII.—Malays, Indian Game, and Aseels.	XVIII.—Turkeys and Guinea Fowl.
VIII.—French Table Breeds—Houdans, Crevecoeur, and La Fleche.	XIX.—Ducks.
IX.—Non-sitting Varieties—Spanish, Minorcas, Andalusian, and Leghorn.	XX.—Geese.
X.—Non-sitting and other Varieties.	XXI.—Diseases of Poultry.
XI.—Housing.	XXII.—Fallacies of Poultry Farming.
	XXIII.—Fowls in Small Runs.
	XXIV.—Caponising.

DAY'S BRITISH AND IRISH FISHES.

*In two volumes, imperial 8vo., cloth, price Two Guineas,
by post £2 3s. 6d.*

THE

FISHES OF GREAT BRITAIN

AND

IRELAND.

By FRANCIS DAY, F.L.S., F.Z.S., &c.

The Standard Work for Zoological Students, Fishculturists, Fishermen, and the public; the value of this grand work is much increased by nearly Two Hundred Plates and Woodcuts.

Mr. Day has personally delineated every species from nature, and incorporated many discoveries of recent times.

*Now Ready, Second Edition, super-royal 8vo., price £2 2s.,
by post £2 3s.*

YACHT ARCHITECTURE.

By DIXON KEMP,

Associate of the Institute of Naval Architects and Member of the Council.

THIS WORK enters into the whole subject of the laws which govern the resistance of bodies moving in water, and the influence a wave form of body and wave lines have upon such resistance.

It also deals comprehensively with the subject of STEAM PROPULSION as applied to yachts.

An easy SYSTEM for DESIGNING is provided, and every necessary calculation is explained in detail.

The latter part of the work is devoted to YACHT BUILDING, and engravings are given of every detail of construction and fitting, including laying off, taking bevells, &c.

The List of Plates (exclusively of over thirty devoted to the elucidation of the text, and nearly two hundred woodcuts) exceeds fifty, and comprise the LINES of some of the most CELEBRATED YACHTS AFLOAT by the most successful builders and designers.

SEVENTH EDITION.

Now ready, super-royal 8vo., price 25s., by post 26s.

A MANUAL OF YACHT AND BOAT SAILING

BY

DIXON KEMP, A.I.N.A.,

Associate Institute Naval Architects (Member of the Council).

Author of "Yacht Designing" and "Yacht Architecture."

(The Lords Commissioners of the Admiralty have ordered this work to be supplied to the Libraries of the ships of the Royal Navy.)

This Edition is largely re-written, and contains a great number of new subjects, and the lines of many boats never before published, the total number of Plates exceeding 100, besides more than 350 woodcuts in the text.

Price 2s. 6d., by post 2s. 10d.

THE

YACHT RACING CALENDAR AND REVIEW FOR 1891.

BY

DIXON KEMP, A.I.N.A..

Author of "Yacht and Boat Sailing," &c.

CONTENTS:

REGATTAS AND MATCHES.
ABSTRACT OF MATCHES SAILED
IN 1891.
GENERAL REVIEW.
BOOKS FOR YACHTSMEN.

YACHT RACING.
CRUISING.
LAUNCHES AND TRIAL TRIPS.
OBITUARY.
INDEX.

THIRD EDITION, ENLARGED AND REVISED.

Large post 8vo., with Illustrations, price 5s. cloth, by post 5s. 4d.

THE COUNTRY HOUSE.

A COLLECTION OF USEFUL INFORMATION AND RECIPES,

Adapted to the Country Gentleman and his Household, and of the greatest utility to the Housekeeper generally.

By I. E. B. C.,

Editor of "Facts and Useful Hints relating to Fishing and Shooting," and "The Gamekeeper's and Game Preserver's Account Book and Diary."

In demy 8vo., price 3s. 6d., by post 3s. 9d.

HINTS

ON THE

MANAGEMENT OF HAWKS.

BY

J. E. HARTING.

Author of "A Handbook of British Birds," "Essays on Sport and Natural History."

8vo., pp. 463, with 32 illustrations, price 10s. 6d., by post 11s.

ESSAYS

ON

SPORT AND NATURAL HISTORY.

By J. E. HARTING.

CONTENTS.

Shooting — Hawking — Fishing — Training Hawks — Lark Mirrors — Plover Catching—Fishing with Cormorants—Decoys—The Irish Wolfhound—The Badger—Wild Turkeys—The Great Bustard—Seals—Wild Swans, &c.

Thirty-eight Essays: concluding with Practical Hints on Bird Preserving for the use of Travellers and Collectors.

ILLUSTRATED WITH FULL-PAGE ENGRAVINGS DRAWN PRINCIPALLY FROM
LIFE BY HARRISON WEIR.

In Imperial 4to., bevelled boards, gilt edges, price 18s., by post 18s. 9d.

THE
CATTLE OF GREAT BRITAIN:
BEING
A SERIES OF ARTICLES
ON THE
VARIOUS BREEDS OF CATTLE OF THE UNITED KINGDOM,
THEIR HISTORY, MANAGEMENT, &c.

EDITED BY THE LATE JOHN COLEMAN,

Editor of the Farm Department of "The Field," and formerly Professor of Agriculture
at the Royal Agricultural College, Cirencester.

ILLUSTRATED WITH FULL-PAGE ENGRAVINGS DRAWN PRINCIPALLY FROM
LIFE BY HARRISON WEIR.

In Imperial 4to., bevelled boards, gilt edges, price 18s., by post 18s. 9d.

THE
SHEEP AND PIGS OF GREAT BRITAIN:
BEING
A SERIES OF ARTICLES
ON THE VARIOUS
BREEDS OF SHEEP AND PIGS OF THE UNITED KINGDOM,
THEIR HISTORY, MANAGEMENT, &c.

EDITED BY THE LATE JOHN COLEMAN,

Editor of the Farm Department of "The Field," and formerly Professor of Agriculture
at the Royal Agricultural College, Cirencester.

"THE FIELD" OFFICE, BREAM'S BUILDINGS, LONDON, E.C.

NEW AND CHEAPER EDITION OF THE CATTLE, SHEEP, AND PIGS OF GREAT BRITAIN.

With Illustrations from the Original Drawings by Harrison Weir, in 1 vol., price 12s. 6d., by post 13s.

The Cattle, Sheep, and Pigs of Great Britain :

Being a Series of Articles on the Various Breeds of the United Kingdom. their History, Management, &c.

Edited by the late JOHN COLEMAN,

Editor of the Farm Department of "The Field," and formerly Professor of Agriculture at the Royal Agricultural College, Cirencester.

CONTENTS.

- | | |
|--|--|
| <p>THE CATTLE OF GREAT BRITAIN.
 I.—Introductory.
 II.—Breeding and General Management.
 III.—Principles of Feeding, and Value of Different Kinds of Food.
 IV.—Buildings, and the Management of Manure.
 V.—Dairy Management, the Milk Trade, &c.
 VI.—Shorthorns. By John Thornton.
 VII.—The Hereford Breed of Cattle. By T. Duckham.
 VIII.—Devon Breed of Cattle. By Lieut.-Col. J. T. Davy.
 IX.—The Longhorns. By Gilbert Murray.
 X.—The Sussex Breed of Cattle. By A. Heasman.
 XI.—Norfolk and Suffolk Red-Polled Cattle. By Thomas Fulcher.
 XII.—Galloway Cattle. By Gilbert Murray.
 XIII.—The Angus-Aberdeen Cattle.
 XIV.—The Ayrshire Breed of Cattle. By Gilbert Murray.
 XV.—West Highland Cattle. By John Robertson.
 XVI.—The Glamorgan Breed of Cattle. By Morgan Evans.
 XVII.—Pembrokeshire or Castlemartin Cattle. By Morgan Evans.
 XVIII.—The Anglesea Cattle. By Morgan Evans.
 XIX.—The Kerry Breed of Cattle. By the late R. O. Pringle.
 XX.—The Jersey Breed of Cattle. By John M. Hall.
 XXI.—The Guernsey Breed of Cattle. By "A Native."</p> <p>THE SHEEP OF GREAT BRITAIN.
 I.—Introductory.
 II.—The Management of Ewes up to Lambing.</p> | <p>III.—Preparations for and Attention during Lambing.
 IV.—Management from Birth to Weaning.
 V.—From Weaning to Market.
 VI.—On Wool.
 VII.—Leicester Sheep.
 VIII.—Border Leicesters. By John Usher.
 IX.—Cotswold Sheep.
 X.—Long-Woolled Lincoln Sheep.
 XI.—The Devon Long-Wools. By Joseph Darby.
 XII.—Romney Marsh Sheep.
 XIII.—Southdown Sheep.
 XIV.—The Hampshire or West Country Down Sheep. By E. P. Squarey.
 XV.—Shropshire Sheep.
 XVI.—Oxfordshire Down Sheep. By Messrs. A. F. M. Druce and C. Hobbs.
 XVII.—The Roscommon Sheep. By the late B. O. Pringle.
 XVIII.—Negrette Merino Sheep.
 XIX.—Exmoor Sheep.
 XX.—The Black-faced or Scotch Mountain Sheep.
 XXI.—Cheviot Sheep. By John Usher.
 XXII.—Dorset Horned Sheep. By Joseph Darby.
 XXIII.—Welsh Mountain Sheep. By Morgan Evans.
 XXIV.—The Radnor Sheep. By Morgan Evans.
 XXV.—Herdwick Sheep. By H. A. Spedding.</p> <p>THE PIGS OF GREAT BRITAIN.
 I.—Introductory.
 II.—The Berkshire Pig.
 III.—Black Suffolk Pigs.
 IV.—Large White Breed of Pigs.
 V.—Small White Pigs.
 VI.—Middle Bred White Pigs.
 VII.—The Black Dorset Pig.
 VIII.—The Tamworth Pig.</p> |
|--|--|

Now ready, demy 8vo., price 2s., by post 2s. 2d.

THE
SPORTSMAN'S VADE-MECUM
 FOR THE
HIMALAYAS.

CONTAINING
 NOTES ON SHOOTING, CAMP LIFE, &c.
 FULLY ILLUSTRATED.

BY **K. C. A. J.**

In 8vo., price 1s., by post 1s. 3d.

THE
Manifestation of Disease
in Forest Trees,
THE CAUSES AND REMEDIES.

BY
CHARLES E. CURTIS, F.S.I., F.S.S.,

Professor of Forest Economy, Field Engineering, and General Estate Management at the College of Agriculture, Downton, Salisbury; Member of the American Academy of Political and Social Science; Consulting Forester to the Right Honourable Lord O'Neill, Shanes Castle, Antrim, Ireland; Author of "Estate Management" (3rd Edition; *Field Office*); "Practical Forestry" (Office of *Land Agents' Record*), "Principles of Forestry" (*R. A. Society's Journal*), "Valuation of Property" (*Field Office*), &c., &c.

Now ready, 1 Vol., cloth, price 7s. 6d., by post 7s. 9d.; 2 Vols., flexible morocco, price 10s., by post 10s. 3d.

FIGURE-SKATING,
SIMPLE AND COMBINED :

BEING AN ENLARGED EDITION OF

"COMBINED FIGURE SKATING."

Arranged as a complete text-book of the Art of Skating as practised in the leading Skating Clubs of Great Britain.

BY

MONTAGU S. MONIER-WILLIAMS, M.A., Oxon; WINTER RANDELL
PIDGEON, M.A., Oxon; and ARTHUR DRYDEN, B.A., Cantab.

"THE FIELD" OFFICE, BREAM'S BUILDINGS, LONDON, E.C.

SECOND EDITION. *Large post 8vo., price 7s. 6d., by post 8s.*

THE
 “IDSTONE” PAPERS.

A SERIES OF ARTICLES AND DESULTORY OBSERVATIONS ON
 SPORT AND THINGS IN GENERAL.

BY
 “IDSTONE,”
 OF “THE FIELD.”

PUBLISHED ANNUALLY.

Nearly ready, Vol. VI., 1892-93, price 3s. 6d., by post 3s. 10d.

THE GOLFING ANNUAL

Edited by D. S. DUNCAN.

*** The attention of golfers is called to this work, which differs from kindred publications in many respects. It contains Original Articles, not merely Reprints; and its Club Directory is the only Complete and Accurate List of Golf Clubs and Descriptions of Golf Greens ever published.

SECOND EDITION.

Price 2s. 6d., by post 2s. 8d., in limp cloth.

RABBITS FOR PROFIT AND RABBITS FOR POWDER.

A Treatise upon the New Industry of
 Hutch Rabbit Farming in the Open, and upon Warrens specially intended for
 Sporting Purposes; with Hints as to their Construction, Cost, and Maintenance.

BY
R. J. LLOYD PRICE.

“THE FIELD” OFFICE, BREAM’S BUILDINGS, LONDON, E.C.

THIS WORK CONTAINS ABOVE 700 PAGES, AND NEARLY 400
ILLUSTRATIONS.

*Second Edition, with additions, price 15s., by post 15s. 9d.,
cloth gilt.*

SHIFTS AND EXPEDIENTS

OF

CAMP LIFE, TRAVEL, AND EXPLORATION.

BY

W. B. LORD, Royal Artillery,
AND
T. BAINES, F.R.G.S.

FIFTH EDITION.

*Re-written, with additions and new full-page Engravings. In one
volume, bevelled boards, gilt edges, price 15s., by post 15s. 9d.*

THE

DOGS OF THE BRITISH ISLANDS :

BEING

A SERIES OF ARTICLES

ON

THE POINTS OF THEIR VARIOUS BREEDS.

AND

THE TREATMENT OF THE DISEASES TO WHICH
THEY ARE SUBJECT.

REPRINTED FROM "THE FIELD" NEWSPAPER.

BY THE LATE

J. H. WALSH,

"STONEHENGE," EDITOR OF "THE FIELD."

(WITH THE AID OF SEVERAL EXPERIENCED BREEDERS.)

"THE FIELD" OFFICE, BREAM'S BUILDINGS, LONDON, E.C.

SECOND EDITION.

*Demy 8vo., printed on plate paper, with Illustrations on toned paper,
price 3s. 6d., by post 3s. 11d.*

A HISTORY AND DESCRIPTION,
WITH
REMINISCENCES,
OF
THE FOX TERRIER:

BY
RAWDON B. LEE,

Kennel Editor of "The Field."

THE ILLUSTRATIONS BY ARTHUR WARDLE.

A FEW COPIES ON LARGE PAPER. Price 10s. 6d., by Post 11s.

*Demy 8vo., printed on plate paper, with Illustrations by Arthur
Wardle, price 3s. 6d., by post 3s. 11d.*

A HISTORY AND DESCRIPTION
OF THE
COLLIE OR SHEEP DOG,
IN
HIS BRITISH VARIETIES.

BY
RAWDON B. LEE,

Kennel Editor of "The Field," and Author of "The Fox Terrier."

A FEW COPIES ON LARGE PAPER. Price 10s. 6d., by post 11s.

Demy 8vo., pp. 480, price 15s., by post 15s. 6d., VOLUME I. of

THE
**MODERN SPORTSMAN'S
 GUN AND RIFLE,**

INCLUDING

**GAME AND WILDFOWL GUNS, SPORTING AND MATCH RIFLES
 AND REVOLVERS.**

IN TWO VOLUMES.

Vol. I.—Game and Wildfowl Guns.

By the late J. H. WALSH,

"STONEHENGE," EDITOR OF "THE FIELD,"

Author of "Dogs of the British Islands," "The Greyhound," "British Rural Sports," &c.

*Demy 8vo., pp. 500, with 200 Illustrations, price 15s., by post 15s. 6d.,
 VOLUME II. of*

THE
**MODERN SPORTSMAN'S
 GUN AND RIFLE,**

INCLUDING

**GAME AND WILDFOWL GUNS, SPORTING AND MATCH RIFLES AND
 REVOLVERS.**

Vol. II.—The Rifle and Revolver.

By the late J. H. WALSH,

"STONEHENGE," EDITOR OF "THE FIELD,"

Author of "Dogs of the British Islands," "The Greyhound," "British Rural Sports," &c.

CONTENTS.

Definitions, &c.—Theory of Projectiles—The Mechanical Construction of the Sporting Rifle and its Ammunition—Modern Rifled Pistols—The Match or Target Rifle, and its Ammunition.

Demy 4to., with 12 full-page Illustrations, some of which contain Portraits of Sporting Celebrities, and 24 vignettes, price 10s. 6d., by post 11s.

SPORTING SKETCHES

WITH

PEN AND PENCIL.

BY THE LATE

FRANCIS FRANCIS AND A. W. COOPER.

CONTENTS.

The First of September.	Rabbit Shooting.
A Day in a Punt.	Roaching.
Mark Cock!	Grouse Shooting.
Trouting.	Salmon Fishing.
Long Tails and Short Ones.	Snipe Shooting.
Paying the Pike.	Grayling Fishing.

Crown 4to., printed on toned paper, price 15s., by post 16s.

THE

ANNALS OF TENNIS.

BY

JULIAN MARSHALL.

THIS work will be found very complete, and, it is thought, justly entitled to take its place as the standard work on Tennis. It has cost its author much laborious research; and, independently of its great value to tennis players and all lovers of the game, it is trusted, from the vast amount of curious lore it contains, the volume will be found not unworthy of a place on the shelves of the scholar. The author, himself a well-known amateur, is fully competent to speak with authority on the game, having had the opportunity of studying the play of the best Continental, in addition to that of the best English, masters, and, therefore, may be taken as a safe guide by learners.

CONTENTS.

I.—Tennis Abroad.	IV.—The Laws and their History.
II.—Tennis in England.	V.—The Game.
III.—The Court and Implements.	VI.—Appendix.

A PRESENTATION VOLUME FOR CLUBS.

4to., bevelled boards, gilt edges, (500 pages), with appropriate illustrations, price 10s. 6d., by post 11s. 3d.

THE
ENGLISH GAME OF CRICKET:

COMPRISING A DIGEST OF ITS

ORIGIN, CHARACTER, HISTORY, AND PROGRESS,

TOGETHER WITH

AN EXPOSITION OF ITS LAWS AND LANGUAGE.

BY

CHARLES BOX,

Author of "The Cricketers' Manual," "Reminiscences of Celebrated Players," Essays on the Game, "Songs and Poems," "Theory and Practice of Cricket, &c.

CONTENTS.

Chap.	Chap.
I. } TO } Introductory.	XV.—Warwickshire and Derbyshire.
VI. }	XVI.—Gloucestershire.
Glances at the Past and Present State of County Cricket.	XVII.—Lancashire and Leicestershire.
VII.—Middlesex.	XVIII.—The Eastern Counties.
VIII.—Public School Matches.	XIX. } Intercolonial Matches.
IX.—Kent.	XX. }
X.—Hampshire.	XXI.—School and Village Matches.
XI.—Surrey.	XXII.—Curiosities of Cricket.
XII.—Sussex.	XXIII.—Cricket Grounds.
XIII.—Nottinghamshire.	XXIV.—Laws of the Game.
XIV.—Yorkshire.	XXV.—Poems, Songs, and Ballads.
	XXVI.—Glossary of Words and Phrases.
	POSTSCRIPT.—Shakespeare and Cricket
	—An Enforced Dissertation.

PUBLISHED ANNUALLY. *In post 8vo., price 1s. 6d., by post 1s. 8d.*

THE ANGLER'S DIARY

AND

TOURIST FISHERMAN'S GAZETTEER.

CONTAINS

A Record of the Rivers and Lakes of the World, to which is added a List of Rivers of Great Britain, with their nearest Railway Stations.

Also Forms for Registering the Fish taken during the year; as well as the Time of the Close Seasons and Angling Licences.

By I. E. B. C.,

Editor of "The Gamekeeper's and Game Preserver's Account Book and Diary," &c.

"THE FIELD" OFFICE, BREAM'S BUILDINGS, LONDON, E.C.

SECOND EDITION. *Large post 8vo., price 5s., by post 5s. 3d.*

ANGLING.

BY THE LATE

FRANCIS FRANCIS.

Author of "A Book on Angling," "By Lake and River," "Hot-Pot," &c.

CONTENTS.

PREFACE.

Chap.

- I.—The Art of Angling.
 II.—Mid-Water Fishing.
 III.—Surface or Fly Fishing.
 IV.—The Gudgeon, the Pope or Ruff, the Bleak, the Roach, the Rudd, the Dace, the Chub, the Barbel, the Bream, the Carp, the Tench, the Perch.

Chap.

- V.—The Pike.
 VI.—Trout Fishing with Bait.
 VII.—Fly Fishing for Trout.
 VIII.—Trout Flies.
 IX.—Grayling Fishing.
 X.—Salmon Fishing.
 XI.—Salmon Flies.
 XII.—On Tackle Making.
 ADDENDA.

Post 8vo., in cloth, price 5s., by post 5s. 4d.

HOT-POT.

MISCELLANEOUS PAPERS

BY THE LATE FRANCIS FRANCIS,

Author of "A Book on Angling," "By Lake and River," "Angling," &c.

Price 2s. 6d. by post 2s. 9d.

GAME REGISTER,

GIVING AN ACCOUNT OF EACH HEAD OF GAME KILLED, AND HOW
DISPOSED OF.

Containing also Divisions for Registering Sporting Engagements and
General Observations.

Price 1s., by post 1s. 1d.

TATTERSALL'S RULES ON BETTING,

WITH EXPLANATORY NOTES AND COMMENTS,

Containing an Account of Cases decided by Tattersall's Committee, with a Copious
Index, and the Rules of Racing appended.

By G. HERBERT STUFFIELD, Barrister-at-Law,

Author of the "Law Relating to Betting, Time Bargains, and Gaming."

Crown 8vo., price 1s., by post 1s. 2d., in Coloured Wrapper, and Page
Illustrations drawn by WHYMPER.

TWENTY-SIX YEARS' REMINISCENCES

OF

SCOTCH GROUSE MOORS.

BY W. A. ADAMS.

CONTENTS.

Seasons 1863 to 1888—A Hare Day—Remarks on the Outcome of
Disease—Heather-Burning and Draining—Surface Draining—Dogs—
Disease—Wildfowl—Conclusion—Summary.

*Demy 8vo., with folding plates and full-page Illustrations printed on
toned paper, price 10s. 6d., by post 11s.*

MODERN WILDFOWLING.

BY

LEWIS CLEMENT,

"WILDFOWLER."

OPINIONS OF THE PRESS.

"An excellent work indeed, and full of capital illustrations, is 'Modern
Wildfowling;' to recommend it aright I should have, if I were clever enough, and
it did not already exist, to invent the famous phrase, 'a book no gentleman's
library should be without.'"—*Truth*, March 17, 1881.

"This book deals not only with the various modes of approaching, or decoying,
and killing wildfowl of all kinds, but enters into minute details upon the construc-
tion of punts, both single and double handed; sails; punt guns, muzzle-loading
as well as breechloading; recoil apparatus; and shoulder guns of all patterns,
with the varying loads required for different bores. In addition to this are several
chapters devoted to a narration of the adventures of the author while in pursuit
of wildfowl, both at home and abroad—which are very pleasant reading.
With the addition of a good index, sportsmen will have in this work a capital *vade
mecum* on the art of wildfowling."—*The Zoologist* for November, 1880.

Large post 8vo., price 3s. 6d., by post 3s. 9d.

PRACTICAL PHEASANT REARING:

WITH AN APPENDIX ON GROUSE DRIVING.

By RICHARD JOHN LLOYD PRICE,

Author of "Rabbits for Profit and Rabbits for Powder," &c.

CONTENTS.

Chap. I.—The General History of the Pheasant — Treating of the Pheasant and its Egg.	Chap. VII.—Recipes for the Preparation of and Instructions for the proper Administration of the Food to Young Pheasants.
II.—The Barn Door Hens.	VIII.—The Diseases of Young Pheasants and their Cure.
III.—The Eggs and the Appliances necessary for Hatching.	IX.—Catching up, Moving into Coverts, and the proper Food for Older Birds.
IV.—Hatching Out—The Incubator.	X.—Miscellaneous Remarks, and a few Words on Turkeys.
V.—The Bearing Field — Protection from Vermin.	
VI.—Moving of the Coops and Treatment of the Young Birds.	

APPENDIX.—HINTS ON GROUSE DRIVING.

Chap. I.—Practical Hints on Driving Grouse.	Chap. III.—The Working of the Drive, and the Duties of the Drivers.
II.—Practical Hints on Driving Grouse (continued).	

Price 8d., by post 9d.

"THE FIELD" LAWN TENNIS UMPIRES' SCORE-SHEET BOOK

[60 SETS],

With Instructions for the Use of Umpires. Adapted for the Use of Umpires, as used at the Championship Meetings.

Nearly ready, price 5s., by post 5s. 4d.

THE ARCHER'S REGISTER

FOR
1891-92.

EDITED BY F. T. FOLLETT,
Archery Correspondent of "The Field."

THIRD EDITION (REVISED 1889). *Price 7s. 6d., by post 7s. 10d.*

A SYSTEM OF FIGURE SKATING.

BY

By H. E. VANDERVELL AND T. MAXWELL WITHAM
(Members of the Skating Club).

The present Revised Edition contains a New Chapter describing the Club Figures, which will enable country skaters to perfect themselves in the art of combined skating.

FOURTH EDITION. *In post 8vo., limp cloth, gilt, price 1s., by post 1s. 2d.*

THE ART OF SKATING;

WITH

ILLUSTRATIONS, DIAGRAMS, AND PLAIN DIRECTIONS FOR THE
ACQUIREMENT OF THE MOST DIFFICULT AND GRACEFUL
MOVEMENTS.

By GEORGE ANDERSON ("Cyclos"),

Vice-President of the Crystal Palace Skating Club, and for many years President
of the Glasgow Skating Club.

Royal 8vo., price 10s. 6d., by post 11s.

HORSE BREEDING RECOLLECTIONS.

BY

COUNT G. LEHNDORFF,

CONTAINING:

Notes on the Breeding of Thoroughbreds—In-breeding and Out-crossing—Pedigrees of all the Principal Sires—and Genealogical Tables of Celebrated Thoroughbreds.

Crown 8vo., profusely Illustrated, price 2s. 6d., by post, 2s. 9d.

GIPSY TENTS AND HOW TO USE THEM.

By G. R. LOWNDES.

VOLUMES I. and II. (containing Parts I. to VI.), in crown 8vo.,
red cloth, price 6s., by post 6s. 6d. each vol.

THE
HUNTING COUNTRIES
OF
ENGLAND,

THEIR FACILITIES, CHARACTER, AND REQUIREMENTS.

A GUIDE TO HUNTING MEN.

By "BROOKSBY."

CONTENTS.

PART I.—Introduction—The Belvoir—The South Wold—The Brocklesby—The Burton and The Blankney—The Fitzwilliam—The Quorn—The Cottesmore—The Puckeridge—The Old Berkeley.

PART II.—The North Warwickshire—The Pytchley—The Woodland Pytchley—The Atherstone—The Billesdon or South Quorn—The Meynell—The Bicester and Warden Hill Hunt—The Heythrop—The Old Berkshire—The South Oxfordshire—The South Nottinghamshire—The East Kent—The Tickham—The Vine—The South Berkshire—Mr. Garth's—The H. H.—The Tedworth—Lord Ferrers'—The Warwickshire.

PART III.—The Dulverton—The Stars of the West—Mr. Luttrell's—Lord Portsmouth's—The Essex and the Essex Union—The Hertfordshire—The Whaddon Chase—The Vale of White Horse—The Cheshire and South Cheshire—The Blackmoor Vale—The Cambridgeshire—The Duke of Grafton's—The Holderness—The Oakley—The North Herefordshire—The Duke of Buccleuch's—The Tynedale—Lord Percy's—The Morpeth—The Rufford.

Also (VOLUME II.)

PART IV.—The Badsworth—The Southdown—The East Essex—The Bramham Moor—The East Sussex—The Essex and Suffolk—The York and Ainsty—Lord Fitzwilliam's—The Crawley and Horsham—The West Kent—Sir Watkin Wynn's—The Hursley—The Hambledon—Lord Coventry's—The Grove—The West Norfolk—The Bedale—Lord Zetland's—The Craven—The Surrey Union.

PART V.—The Old Surrey—Mr. Richard Combe's—The Burstow—The Hurworth—The Cattistock—The Suffolk—The Shropshire—The Earl of Radnor's—Capt. Hon. F. Johnstone's—The South Durham—The Worcestershire—The Ledbury—The South Herefordshire—The South Staffordshire—The North Staffordshire—The Duke of Beaufort's—The Cotswold—The Dumfriesshire—The Albrighton—The North Cotswold.

PART VI.—Lord Middleton's—The Sinnington—The Wheatland—The United Pack—The Chiddingfold—Lord Fitzhardinge's—Hon. Mark Rolle's—South-and-West Wilts—Lord Portman's—The Cleveland—The North Durham—Braes of Derwent—The Radnorshire and West Hereford—The Monmouthshire.

Each Part is published separately, price 2s. 6d.

Price 1s., by post 1s. 1d.

NOTES ON THE PROOF OF GUNS.

TOGETHER WITH

THE NEW RULES AND SCALES OF PROOF PASSED BY THE
SECRETARY FOR WAR, AND COMMENTS THEREON.

In post 8vo., with Illustrations, price 3s. 6d., by post 3s. 9d.

THE PRACTICAL MANAGEMENT OF FISHERIES

A BOOK FOR PROPRIETORS AND KEEPERS.

By the late **FRANCIS FRANCIS**,

Author of "Fish Culture," "A Book on Angling," "Reports on Salmon Ladders," &c.

CONTENTS.

Chap.	Chap.
I.—Fish and Fish Food.	VI.—On the Rearing of Fry and the Conduct of Ponds, Stews, &c.
II.—How to Grow Fish Food and how to Make Fishes' Homes.	VII.—Some Hatcheries.
III.—On the Management of Weeds and the Economy of Fishing.	VIII.—Coarse Fish.
IV.—The Enemies of Trout and how to Circumvent them.	IX.—On Salmon and Trout Ladders and Passes.
V.—The Artificial Incubation of Ova.	APPENDIX.—Notes, &c.

Crown 8vo., price 2s. 6d., by post 2s. 9d.

PUBLIC SHOOTING QUARTERS

IN ENGLAND, WALES, SCOTLAND, IRELAND, AND ON THE CONTINENT.

By "**WILDFOWLER**,"

Author of "Shooting and Fishing Trips," "Modern Wildfowling," "Table of Loads," &c.

A TABLE of CALCULATIONS for use with "The Field" Force Gauge for Testing Shot Guns. Also an Illustration and Description of the Apparatus. In demy 4to., price 2s. 6d.

SIXTY-EIGHTH HALF-YEARLY ISSUE.

THE COURSING CALENDAR, for the Autumn Season 1891, contains Returns of all the Public Courses run in Great Britain and Ireland. A revised List of Addresses of Coursing Secretaries, Public Coursers, Judges, Slippers, and Trainers, with List of Waterloo Cup Winners, Greyhound Sales, &c. Edited by C. M. BROWNE ("ROBIN HOOD"). Price 10s. 6d.

OFFICIAL EDITION OF THE LAWS OF LAWN TENNIS.

Now ready, price 6d., by post 7d.

THE LAWS of LAWN TENNIS for the year 1892, issued under the authority of the LAWN TENNIS ASSOCIATION.

OFFICIAL EDITION OF THE REGULATIONS FOR THE MANAGEMENT OF LAWN TENNIS PRIZE MEETINGS, 1892.

Now ready, price 6d., by post 7d.

REGULATIONS for the MANAGEMENT of LAWN TENNIS PRIZE MEETINGS and INTER-COUNTY and INTER-CLUB MEETINGS, issued under the authority of the LAWN TENNIS ASSOCIATION.

Demy 8vo., price 5s. 6d., by post 5s. 10d.

THE
ROTHAMSTED EXPERIMENTS

ON THE
GROWTH OF WHEAT, BARLEY, AND THE MIXED HERBAGE
OF GRASS LAND.

BY **WILLIAM BREAM.**
(B.Sc. LOND., F.L.S., F.G.S., F.S.S.)

THIRD EDITION. *In demy 8vo., price 10s. 6d., by post 11s.*

ESTATE MANAGEMENT:

A PRACTICAL HANDBOOK FOR LANDLORDS, AGENTS,
AND PUPILS,

By **CHARLES E. CURTIS.**

WITH A

LEGAL SUPPLEMENT BY A BARRISTER.

Extract from Preface.—"He who intends to qualify himself for such interesting and responsible work as the care and oversight of landed property must in these days of keen competition, give up the idea that he need only abandon himself to the pleasures of a country life, and that all needful information will be picked up by the way."

CONTENTS:

Chap.	Chap.	
I.—Letting and Leases.	VIII.}	Repairs and Materials.
II.—Farm Valuations.	IX.}	
III.—Forestry.	X.—	The Blights of Wheat and other Cereals.
IV.—Underwood.	XI.—	Accounts.
V.—Fences.	XII.—	Useful Rules of Arithmetic and Mensuration.
VI.—Grasses suitable for Woods and Plantations.		
VII.—The Home Farm.		

In crown 8vo., price 1s., by post 1s. 1d.

CATECHISM OF ESTATE MANAGEMENT.

SECTION I.

LETTING AND LEASES.

By **CHAS. E. CURTIS, F.S.I.,**

Professor of Estate Management at the College of Agriculture, Principal of the School of Estate Management, Author of "Estate Management," &c.

Price 6s., by post 6s. 6d.

SECOND EDITION, Greatly Enlarged (with Illustrations and Plans of Silos),

S I L O S

FOR

PRESERVING BRITISH FODDER CROPS STORED
IN A GREEN STATE.

Notes on the Ensilage of Grasses, Clovers, Vetches, &c.

COMPILED AND ANNOTATED

BY THE

EDITOR OF "THE FIELD."

Price 6d., by post 7d.

SHORT NOTES ON SILO EXPERIMENTS AND PRACTICE.

(Extracted from "Silos for Preserving British Fodder Crops.")

Price 1s., by post 1s. 1d.

THE SCIENCE AND ART OF TRAINING. A HANDBOOK FOR ATHLETES.

BY HENRY HOOLE, M.D. (Lond.),

Medical Officer to the Stock Exchange Clerks' Provident
Fund.

CONTENTS.

Introduction.

Chap. I.—The Preparation for Athleticism.

Chap. II.—The Formation and Development of the Human Body.

Chap. III.—Food.

Chap. IV.—The Nutrition of the Body. Hunger and Thirst. Diet and Digestion.

Chap. V.—The Muscular System.

Chap. VI.—Exercise and Rest.

Chap. VII.—Personal Hygiene.

Appendix.

In crown 8vo., with Thirteen full-page Plates, price 2s. 6d., by post 2s. 9d.

THE SWIMMING INSTRUCTOR: A TREATISE ON THE ARTS OF SWIMMING AND DIVING.

By WILLIAM WILSON.

Author of "Swimming, Diving, and How to Save Life," "The Bather's Manual,"
"Hints on Swimming."

In crown 8vo., price 2s. 6d., by post 2s. 8d.

MANURES:

THEIR RESPECTIVE MERITS FROM AN ECONOMICAL
POINT OF VIEW.

BY A. W. CREWS,

Author of "Guano: its Origin, History, and Virtues," "The Potato and its Cultivation," &c.

CONTENTS.

PART I.—Definition of the Word "Manure"—Nature's Modes of Applying Fertilisers—History—Classification.

PART II.—The Value of Ploughing Down Green Crops—Weeds—Sea-weed—Straw—Sawdust—Tanners' Bark—Wood Ashes—Peat—Rape Cake—Hemp—Poppy, Cotton, and Cocoa-nut Cakes—Bran—Malt Dust—Brewers' Grains—Coal—Soot—Charcoal.

PART III.—Dead Animals—Fish—Blood—Animalised Charcoal—Bones—Horn—Woollen Rags, Hairs, Feathers, &c.—Night-soil—Farmyard Manure—Guano.

PART IV.—Salts of Ammonia—Salts of Magnesia—Salts of Potash—Salts of Soda—Common Salt—Lime and its Compounds—"Ooze."

In crown 8vo., price 2s., by post 2s. 2d.

THE POTATO AND ITS CULTIVATION.

BY A. W. CREWS.

Author of "Guano: its Origin, History, and Virtues," "Manures: their Respective Merits," &c.

CONTENTS.

Derivation—History—Constituents—Varieties—Sprouting—Soils—Planting—Manures—Earthing up—Disease—Scab—Storing—Forcing—Producing New Varieties—Substitutes for the "Potato"—Miscellaneous Information.

PUBLISHED ANNUALLY. *In large post 8vo.*

THE

KENNEL CLUB STUD BOOK :

CONTAINING A COMPLETE

RECORD OF DOG SHOWS AND FIELD TRIALS,
WITH PEDIGREES OF SPORTING AND NON-SPORTING DOGS.

Vol. I., from 1859 to 1873, price 12s. 6d., by post 13s.

PRICE 10s. 6d., BY POST 10s. 10d. EACH—

Vol. V., 1877; Vol. VI., 1878; Vol. VII., 1879; Vol. VIII., 1880;
Vol. IX., 1881; Vol. XI., 1883; Vol. XII., 1884;

Vol. XIII., 1885; Vol. XIV., 1886; Vol. XV., 1887; Vol. XVI., 1888
Vol. XVII., 1889; Vol. XVIII., 1890.

In handy pocket size, price 1s. 6d., by post 1s. 7d.

THE GAMEKEEPER'S SHOOTING MEMORANDUM BOOK,

FOR THE

REGISTERING OF GAME SHOT, MEMORANDA OF SALE, &c.

By I. E. B. C.,

Editor of "Facts and Useful Hints relating to Shooting and Fishing," "The Gamekeeper's and Game Preserver's Account Book and Diary," &c.

Price 6d., by post 7d.; or 2s. 6d. the half-dozen, by post, 2s. 11d.

"THE FIELD" DUPLICATE JUDGING BOOK

Facilitates the work of the Judges at Poultry and other Shows, by a very simple method of entering and preserving a duplicate judging list.

SECOND EDITION. *Price 2s. 6d., free by post 2s. 8d.*

PRACTICAL DINNERS:

CONTAINING 108 MENUS AND 584 RECIPES.

By "The G. C.,"

Author of "Round the Table."

"It is difficult even for a literary critic to read a cookery book straight through, but we have tested a few of the recipes, and those have been very good."—*Athenæum*.

"To those who wish to raise gastronomy into a fine art, the suggestions of the author will be acceptable, for if the everyday fare of ordinary mortals is to be prepared by 'The G. C.'s' recipes, the result will be a repast suitable to the palate of Lucullus. A variety of new savouries are also given."—*Morning Post*.

"Quite up to the level of a good cook's respectful attention, or an epicure's critical regard. . . . Reducing fine cookery to the understanding of ordinary intelligence. From all approach of ignorant pretension this manual of plain directions is free. . . . The reader will find in these pages a choice of dishes, not one of which is inadequately or erroneously formulated."—*Daily Telegraph*, April 28, 1887.

"THE FIELD" OFFICE, BREAM'S BUILDINGS, LONDON, E.C.

Demy 8vo., price 3s. 6d., by post 3s. 9d., Illustrated with several Diagrams.

THE
PRACTICAL SURVEYOR:
 A TREATISE UPON SURVEYING.

SPECIALLY ARRANGED FOR THE GUIDANCE OF PUPILS, STEWARDS,
 THE SCHOLASTIC PROFESSION, AND INTENDING EMIGRANTS.

BY THOMAS HOLLOWAY.

CONTENTS.

CHAP.	CHAP.
I.—The Man and his Outfit.	XIII.—Example of a Survey of several Fields together, and the Field Book.
II.—The Chain—Cautions to Beginners—Best Figure for Chain Surveying.	XIV.—Reference Numbers to Maps—To put Detached Buildings in correct Positions on a Plan by Means of Unmeasured Lines—Lines Measured on the Work—Making Stations:
III.—Boundaries.	XV.—Plotting—Selection and Management of Paper—Inking in.
IV.—Setting-out Lines by the Eye and passing Obstructions.	XVI.—Surveys made for the purpose of Dividing Land into Stated Quantities.
V.—Division of the Circle and Use of Box Sextant—Chain Angles Condemned—Cross Staff Condemned—The Optical Square—Measuring Inaccessible Distances.	XVII.—Setting-out Allotments and Building Plots.
VI.—The Theodolite — Setting-out Lines with the Theodolite.	XVIII.—Angles and Bearings, and use and Adjustment of Circular Protractor.
VII.—Reduction of the Measure of Undulating Ground to Horizontal Measures and Table of Vertical Angles.	XIX.—Traverse Surveys.
VIII.—Measuring Lines — The Offset Staff and Taking Offsets.	XX.—Trespass.
IX.—To Prove the Correctness of Observations taken with the Sextant — Single Fields Measured with the Chain and Optical Square, so that the Areas can be directly Calculated.	XXI.—Quality Lines — Superstructures and Works Underground—Harvest and Cop-pice Work—Reducings Plans from a Large Plan to a Small One.
X.—To Set-out a Right Angle with the Chain—Figures of the Lines of Measurement best adapted to Irregular Fields.	XXII.—To Copy a Map—Colouring, Penmanship, &c.
XI.—Equalising Boundaries, and Drawing a Triangle equal to a given Figure.	XXIII.—Commencement of a Parish Survey — Surveying to a Scale of Feet.
XII.—Computation of Arrears of Irregular Fields.	XXIV.—Town Surveying.
	XXV.—Testing the Accuracy of a Survey—General Remarks.
	XXVI.—In Memory of the Past.

In crown 8vo., price 3s. 6d., by post 3s. 9d.

ANGLING REMINISCENCES.

By the late FRANCIS FRANCIS,

CONTENTS.—A Christmas Retrospect; Luck! Loch Tay; The Angler's Wish; Spring Salmon Fishing; Grayling Fishing; Barbel Fishing; Cover Shooting; Fly Fishing for Ladies; Saint Mayfly; My First Salmon; The Mayfly Mess; A Month in the West; Trout Fishing; In and Out Dales; Up and Down; Tom Bowers's Christmas.

NINTH YEAR OF PUBLICATION.

Fcap. 8vo., price 1s. 6d., by post, 1s. 9d.

THE
LAWN-TENNIS CALENDAR
FOR 1891.

Edited by B. C. EVELEGH, of "The Field."

NEW EDITION IN THE PRESS.

THE BOOK OF DINNER SERVIETTES

CONTAINS

A NEW INTRODUCTION ON THE DECORATION OF DINNER TABLES,
AND GENERAL DIRECTIONS FOR FOLDING THE SERVIETTES.

*There are Twenty-one different kinds given, with Ninety-two Woodcuts Illustrative
of the various Folds required, and the Serviettes complete.*

In 4to., printed on toned paper, with plates, price 5s., by post 5s. 4d.

THE QUEEN LACE BOOK:

AN

Historical and Descriptive Account of the Hand-made
Antique Laces of all Countries.

BY L. W.

This work contains the whole of the series of articles on Antique Point Lace which have been published in "The Queen." It will prove an invaluable guide and book of reference to ladies interested in Antique Lace, and, with its highly ornamental embossed cover, will form a handsome ornament for the drawing-room table.

Post free, 6d., cloth gilt.

RULES OF THE GAME OF HOCKEY
AND OF
THE HOCKEY ASSOCIATION.

"THE FIELD" OFFICE, BREAM'S BUILDINGS, LONDON, E.C.

PUBLISHED ANNUALLY. *Demy 4to., price 1s., by post 1s. 3d.*

THE RURAL ALMANAC

AND SPORTSMAN'S ILLUSTRATED CALENDAR FOR 1892.

Articles on the following Subjects are included in the List of Contents :

- THE PAST RACING SEASON.
 LIST OF HUNTS, THEIR MASTERS, &c.
 DOGS AND DOG SHOWS.
 DOG TRIALS IN 1891.
 LISTS OF OTTERHOUNDS AND DOG CLUBS.
 THE MAKING OF TROUT PONDS (Illustrated).
 LIVE-BAIT FISHING FOR PIKE.
 ARTIFICIAL PERCH CULTURE.
 SPRING TROUT FLIES.
 HINTS ON MARKING KILLED BIRDS.
 NITRATE OF SODA AS A FERTILISER.
 FARMYARD MANURE.
 MIXED CROPS AND DIETS.
 THE VIRTUE OF GOOD PACKING.
 PLANTING AND ARRANGING ROSES.
 GIANT HARDY PLANTS.
 CONSTRUCTION OF ICEHOUSES (Illustrated).
 THE LEADING CRICKET COUNTIES IN 1891.
 FIRST-CLASS LAWN TENNIS PLAYERS OF 1891.
 STALLIONS FOR BREEDING BLOODSTOCK AND HUNTERS
 (List of about 300 Stallions, with their Pedigrees, and Fees for
 Thoroughbred and Half-Bred Mares).

ALSO SUMMARIES, TABLES, RECIPES, &c., VIZ.,

Agricultural returns for 1890 and 1891	Game, legal season for killing
Amber	Inter-University boat race winners.
Angling close times	Peach trees, gumming in
Apples, cheap drink from	Pedestrian records
Athletic championships and records	Racket championships and matches
Boots, boot tops, breeches, coats, &c., cleaning of	Revolver shooting
Cattle and sheep fairs	Rods, care of
Copyholders' common rights	Racing fixtures for 1892
Cricket fixtures in 1892	Sparrow with abnormal beak
Cricket records	Swimming, amateur records
Dry rot in timbers of houses	Tennis season of 1891
Fishing lines, dressing of	Tide tables
	Worms on lawns.

In crown 8vo., price 5s., by post 5s. 4d.

BOAT-RACING;

OR,

THE ARTS OF ROWING AND TRAINING.

BY

EDWIN DAMPIER BRICKWOOD

(EX-AMATEUR CHAMPION OF THE THAMES).

CONTENTS.

ROWING.	
Chap. I.—Introduction: Past and Present Condition of Boat-racing.	Chap. XI.—The Qualifications of Amateurs.
II.—Racing Boats: Their History and Fittings.	XII.—Boat Clubs: Their Organisation and Administration.
III.—The Sliding Seat: Its Invention, Adoption, and Theory.	XIII.—Historical Records, A.D. 1715 to 1838.
IV.—How to Use an Oar, and Sculls.	XIV.—Historical Records, A.D. 1839 to 1855.
V.—Faults and Errors: What to avoid.	XV.—Historical Records, A.D. 1856 to 1875.
VI.—Steering: Coxswain and Non-coxswain.	TRAINING.
VII.—Teaching Beginners.	XVI.—Its Principles.
VIII.—Coaching for Races, and Selection of Crews.	XVII.—Its Practice.
IX.—The Varieties and Conduct of Boat-races.	XVIII.—Prohibitions, Ailments, &c.
X.—The Laws of Boat-racing.	APPENDIX.—Rules for Betting.
	INDEX.

PUBLISHED ANNUALLY. *Price 1s., by post 1s. 1d.*

THE ROWING ALMANACK AND OARSMAN'S COMPANION FOR 1892.

Edited by **E. D. BRICKWOOD**

(EX-AMATEUR CHAMPION OF THE THAMES),

Author of "Boat-Racing; or, the Arts of Rowing and Training."

CONTENTS.

A Calendar with Space for Memoranda and High Water Table, with a Table of Tidal Observations.	An Itinerary of the River Thames from Oxford to Putney, showing all the points of interest, with Hotels, &c.
A Review of the Rowing Season.	The Laws of Boat-Racing.
Record of all Regattas and Principal Club Races, with a copious Index.	The Rule of the Road on the River.
Amateur Rowing Association.	Thames Navigation Rules.
National Regatta Rules and Regulations	Thames Preservation Act.
Definition of a Tub-boat.	Thames Bye-Laws, 1887.
A Rowing Directory.	Rules and Regulations for Punting.
The Lengths of Racing Courses.	Tables of Winners of all the principal Races and Regattas.

Price One Shilling ; by Post, 1s. 3d.

THE QUEEN ALMANAC, AND LADY'S CALENDAR for 1892.

AMONG ITS CONTENTS WILL BE FOUND

A Chromo-Lithograph Plate of Novelties in Fancy Work.

A SUPPLEMENT OF DESIGNS FOR BENT IRON WORK.

DESIGNS FOR RELIEF AND CHIP CARVING.

Miscellaneous Suggestions for Pyrographic Work ; New Helps for Pyrography ; Floral Arrangements and Bouquets ; Embossed Leather and Metal Work ; Wood Staining at the Working Ladies' Guild ; Paintings on China ; Suggestions for House Decoratins.

THIRTY-TWO PORTRAITS :

Statue of H.R.H. the Princess of Wales, Princess Louise of Schleswig-Holstein and Prince Aribert of Anhalt, the late Hon. Mrs. Augustus Craven, Mrs. French Sheldon, Miss Eames, the late Countess of Rosebery, the late Mrs. Drummond, the late Mme. Blavatsky, the late Miss Linskill, the late Miss Jessie Fothergill, the late Archbishop of York, the late Earl Granville, the new Archbishop of York, the new Bishop of Peterborough, the Dean of Wells, Canon T. Teignmouth Shore, Canon G. F. Browne, the late Sir J. E. Boehm, R.A. ; the late M. Meissonier, the late Mme. Bodichon the late Mr. Edwin Long, R.A. ; Maurel as Iago, Edouard de Reszke, Jean de Reszke, Mme. Richard, Miss Ilona Eibenschutz, Master Jean Gerardy, the Sisters Ravogli, Mrs. Grimwood.

ALSO

Useful Articles in Knitting and Crochet, Girls' Frocks and Hats, Girl's Winter Hats and Coats ; Opera Cloaks ; Greek Headdress, and Directoire Bonnet ; Winter Cape, Jackets, and Girl's Bonnet ; Fashionable Hairdressing and Fancy Headdresses ; Cambric Underlinen ; Evening Toilettes ; Costumes for Girls and Boys, &c.

Full information is given relating to—The Royal Family ; the Royal Household ; the Government ; British and Foreign Ambassadors ; Lords Lieutenant of Counties in the United Kingdom ; Irish and Scotch Representative Peers ; Peers who are Minors ; Peeresses in their own right ; Alphabetical List of the Surnames of the Peers Temporal ; Complete List of the House of Peers, with their Surnames and Titles, and the Titles of their Eldest Sons ; Jewish Calendar ; Bank of England ; Post Office Regulations ; Eclipses in 1892 ; List of Charities, Associations, &c. ; Obituary of Ladies of Distinction during the Past Year.

Menus for three French Breakfasts ; A High Tea for Tennis Party ; Savouries ; Plain Puddings and Sweets ; Stains.

INDEX TO BOOKS.

	PAGE.		PAGE.
Angling... ..	17	Lawn Tennis Regulations ...	22
Angler's Diary	16	Lawn Tennis Calendar ...	28
Angling Reminiscences	27	Manures	25
Annals of Tennis... ..	15	Management of Fisheries ...	22
Archer's Register	19	Modern Sportsman's Gun and Rifle, Vols. I. & II. ...	14
Art of Skating	20	Modern Wildfowling	18
Betting Rules	17	Pheasant Book	3
British and Irish Fishes	5	Pheasant Rearing	19
Boat Racing	30	Potatoes	25
Cattle of Great Britain	8	Poultry.....	4
Cattle, Sheep, and Pigs	9	Practical Dinners	26
Coursing Calendar	22	Practical Surveyor	27
Catechism of Estates... ..	23	Proof of Guns, Notes on ...	21
Collie or Sheep Dog	13	Public Shooting Quarters ...	22
Country House	7	Queen Almanac	31
Dinner Serviette Book	28	Queen Lace Book	28
Disease in Forest Trees.....	10	Rabbits... ..	11
Dogs of the British Islands..	12	Rothamsted Experiments ...	23
English Game of Cricket	16	Rowing Almanac... ..	30
Estate Management	23	Rural Almanac	29
Essays on Sport	7	Salmonidæ	3
Figure-Skating	10	Science and Art of Training	24
Fox Terrier	13	Sheep and Pigs	8
Game Register	17	Shifts, &c., of Camp Life ...	12
Gamekeeper's Shooting Book	26	Silos	24
Gipsy Tents... ..	20	Silo Experiments... ..	24
Golfing Annual	11	Sporting Sketches	15
Hints on Hawks	7	Sportsman's Vade-Mecum... ..	10
Hockey Rules	28	Swimming Instructor	25
Horse Breeding	20	System of Figure Skating ...	20
Hot-Pot	17	Table of Calculations... ..	22
Hunting Countries	21	Twenty-six Years, &c... ..	18
Idstone Papers	11	Yacht and Boat Sailing ...	6
Judging Book	26	Yacht Architecture	5
Kennel Club Stud Book	26	Yacht Racing Calendar ...	6
Lawn Tennis Laws	22		
Lawn Tennis Score Book ...	19		

