

POULTRY
DISEASES

E. J. WORTLEY

SF
995 /
W93

SEP 5 1958

Cornell University Library
SF 995.W93

Poultry diseases, causes, symptoms and t



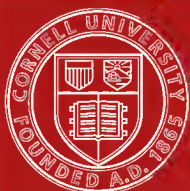
3 1924 000 931 570

vet

LIBRARY
NEW YORK STATE VETERINARY COLLEGE
ITHACA, N. Y.



This Volume is the Gift of
William L. Leeney
from the collection of
Capt. Harold Leeney

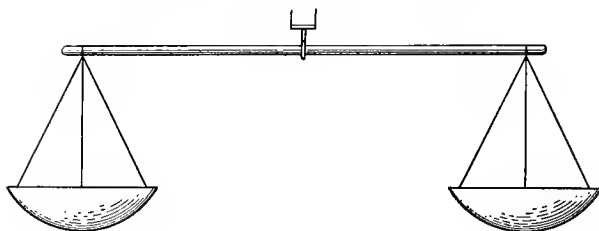


Cornell University Library

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.

PROFIT OR LOSS



DEBIT



Food



Housing



Labor



*Unavoidable
Mortality*



Avoidable



Mortality

CREDIT

Breeding Stock



Meat



Eggs



PROFIT OR LOSS

POULTRY DISEASES

**Causes
Symptoms
and Treatment
With Notes on
Post-Mortem Examinations**

E. J. WORTLEY, F. C. S.

Illustrated

NEW YORK
ORANGE JUDD COMPANY
1915

LONDON
KEGAN PAUL, TRENCH, TRÜBNER & CO., Limited

NEW YORK CITY
LIBRARY OF
LIBRARY

Copyright, 1915, by
ORANGE JUDD COMPANY
All Rights Reserved

Entered at Stationers' Hall
LONDON, ENGLAND

SF
935
W93

PRINTED IN U. S. A.

PREFACE

Poultry farming as a means of profit can be made successful only by maintaining the most vigorous and sustained campaign against disease. The aim of the poultry rearer should be to stamp out disease by preventive measures. Practical experience proves the inefficiency of many so-called cures, and points to the urgency of poultrymen endeavoring to understand more thoroughly the causes of the ailments to which domestic fowls are liable.

My aim is to put a concise handbook into the hands of poultry rearers, who should thus be assisted in determining the various diseases and in taking the precautionary steps important in preventing the introduction and spread of contagious diseases. No effort is made to elaborate the scientific side of the subject. Those desirous of obtaining full information about the types of organisms that have been proved to be the specific causes of, or to be invariably asso-

PREFACE

ciated with, particular disorders, may do so with profit by obtaining fuller works on the subject. Many scientific workers are devoting their time to the problem of combating diseases among poultry, and assistance is willingly given by officers of the experiment stations to farmers who desire to identify any disease causing loss in their flocks.

The practical poultryman will recognize the fact that measures for the control of disease cannot be limited to sanitation and the treatment of sick birds, but, in reality, include such important matters as the selection of healthy stock, intelligent feeding, proper housing, and other details essential to the successful management of poultry.

I gratefully acknowledge my indebtedness to the works of Dr. D. E. Salmon and John H. Robinson, editor of *Farm Poultry*, and to the recent publication on poultry diseases by Dr. Raymond Pearl, Frank M. Surface, and Maynie R. Curtis. My thanks are due to R. S. Martinez for the care taken

PREFACE

in making the photographs from which the drawings for the illustrations in the chapter on Post-Mortem Examinations were prepared. Much valuable information has also been obtained from bulletins issued by the experiment stations of the United States and by the Ontario Agricultural College of Canada.

E. J. WORTLEY.

CONTENTS

	PAGE
CHAPTER I	
GENERAL METHODS OF CONTROLLING DISEASE	1
1. Importance of controlling disease.	
2. Dangers of introducing disease.	
3. Control measures.	
4. Nursing sick birds.	
5. The use of drugs and medicines.	
6. Disinfection.	
CHAPTER II	
SUMMARY OF EXTERNAL SYMPTOMS AND TREATMENT	14
1. Diseases affecting head and respiratory organs.	
2. Diseases affecting organs of digestion and repro- duction.	
3. Diseases affecting legs and feet.	
4. Parasites.	
5. Miscellaneous.	
CHAPTER III	
DISEASES OF POULTRY OTHER THAN FOWLS	19
CHAPTER IV	
DISEASES AND PESTS OF FOWLS	22
(In alphabetical order.)	
CHAPTER V	
POST-MORTEM EXAMINATIONS	99
1. Making the examination.	
2. The normal condition of the internal organs.	
3. Diagnosis of disease by post-mortem symptoms.	

LIST OF ILLUSTRATIONS

FIG.		PAGE
	Profit or Loss	<i>Frontispiece</i>
2	Isolation	5
3	Desolation	6
4	Poultryman's Medicine Shelves	8
5	How Disease Is Spread	10
6	Aids to Thorough Disinfection	12
7	Head Showing Brain Exposed	29
8	{ Windpipe Cut Open }	} 30
	{ A Fungus That Causes Aspergillosis }	
9	Bumblefoot	36
10	Chicken Pox	38
11	Diphtheritic Roup	50
12	{ Chicken Affected with Gapes }	} 60
	{ Gape Worms }	
13	Looking for Lice	67
14	Three Lice That Commonly Affect Fowls	68
15	The Air-Sac Mite	74
16	The Depluming Mite	74
17	The Red Mite	75
18	Organs of Reproduction of the Hen	78
19	Examining a Fowl with a Suspicious Cold	84
20	A Roupy Eye	87
21	Scaly Leg	88
22	The Mite That Causes Scaly Leg	89
23	The Fowl Tick	90
24	Organs Affected by Tuberculosis and Blackhead	91
25	Chickens Affected with White Diarrhea	93
26	Healthy Chickens	93
27	Worms in Intestinal Tract of Fowl	95
28	The Parts of a Fowl	96
29	Skeleton of a Fowl	97
30	Post-Mortem Examination No. 1	100
31	Post-Mortem Examination No. 2	102
32	Post-Mortem Examination No. 3	104
33	Post-Mortem Examination No. 4	106
34	Post-Mortem Examination No. 5	110

CHAPTER I

GENERAL METHODS OF CONTROLLING DISEASE

I. Importance of Controlling Disease

THE ravages of disease add considerably to the difficulties of raising poultry in all parts of the world. It is the experience of poultry rearers that an annual toll has to be paid in the lives of young birds and older stock. Sooner or later, in addition, an epidemic may break out and result in heavy losses and much discouragement.

It is most important, therefore, to be able to recognize the symptoms and to know the causes of the many diseases to which various kinds of poultry are subject. Every practical effort should be made to reduce avoidable mortality. An unexplained death should be regarded with concern. It may point to the presence of a serious disease. When there is not sufficient external

evidence for determining the cause of death, a post-mortem examination should be made (see page 98).

The poultryman must know above all whether he is dealing with an infectious disease or not. The discovery that a sudden death among his fowls is due to apoplexy will set his mind at ease. On the other hand, if a case of cholera occurs, the body of the dead fowl should be burnt, and a vigorous campaign started to prevent the spread of the disease; birds showing mopishness and other suspicious symptoms should be isolated; the houses, the feed troughs, the water vessels, and the yard to which the dead fowl has had access, should all be thoroughly disinfected.

2. Dangers of Introducing Disease

Perhaps more loss has been caused by introducing birds with disease into a healthy flock than by any other means. Readers will, doubtless, be able to recall occasions on which their own, or their neighbors',

flocks suffered. An instance was recently related to the writer. A poultryman was offered two fowls, which he at first refused, but owing to the vagrant seller's importunity, he eventually bought the birds and let them loose among the home flock. On the following day one died; but no effort was made to discover the cause, nor was the dead fowl's body burnt. In a few days, a fowl belonging to the original flock died and, in three to four weeks after the purchase, two-thirds of the stock had died. It afterwards transpired that the vendor had lost several of his fowls from cholera, and the fear of further mortalities had been his reason for being so anxious to dispose of the survivors.

On every farm where poultry is kept, there should be a quarantine ward for new purchases. The most careful breeders will isolate their own birds that have returned from an exhibition, for fear they may have contracted some disease there or on the journey.

3. *Control Measures*

Practical experience and scientific investigation have clearly proved that preventive measures are more economical and effective than curative. Failing prevention, everything points to the importance of dealing promptly with the first cases, owing to the risk of infection of the rest of the stock. Control measures may be divided into three classes:

1. Proper housing and feeding of fowls.
2. General sanitation and disinfection.
3. Administration of medicine to sick birds.

The details to which special attention must be given are covered by the following axiomatic rules:

1. Isolate birds recently purchased—for two or three weeks.
2. Isolate every bird that shows any sign of ill health.
3. Provide a fresh and pure supply of water in a shady position.
4. Add Epsom salts (one teaspoonful to a quart) once a week to the drinking water. Give chickens daily a liberal supply of bran in addition to their other food.
5. Feed birds on a varied diet, including green food.
6. Arrange that birds have to scratch for some of their food.
7. Construct houses, nest boxes, etc., so that they can be readily and thoroughly disinfected. Houses should be free from drafts.
8. Disinfect contaminated soil by spraying, liming, and resting.

GENERAL METHODS OF CONTROLLING DISEASE

9. Visit the roosts at night to detect cases of wheezing due to colds, and to search for mites and other pests.
10. Keep on hand disinfectants, lice powders and medicines likely to be required.

4. Nursing Sick Birds

The small margin of profit on a single fowl makes dosing with medicines and nursing an unprofitable occupation, except in



FIG. 2.—ISOLATION

POULTRY DISEASES AND THEIR TREATMENT

the case of valuable stock. If the treatment of a bird is undertaken, it should be borne in mind that more depends upon attention to the rules of good nursing than to the administration of drugs. Comfortable quarters, warm and free from drafts, clean straw, and invalid's diet of soft and easily



FIG. 3.—DESOLATION

digested food will all turn the chances in favor of recovery.

Too often isolation is in effect a death sentence. The bird is put into cramped quarters, exposed to cold winds and beating rains, and, being in an out-of-the-way corner, is, perhaps, neglected instead of being specially cared for.

Fowls that will not take food should be fed lightly, but frequently, with a spoon in order that their strength may be kept up. All stale food should be removed.

5. The Use of Drugs and Medicines

Drugs and medicines likely to be required should always be kept in stock. The weekly use of Epsom salts, as a mild laxative for preventing intestinal disorders, is strongly recommended. Little faith should be put in drugs said to cure tuberculosis, cholera, etc. Below is given a list of the medicines generally required. The doses given in the table are for a medium-sized adult fowl; three-quarters as much should be given for a half-grown bird, and about

POULTRY DISEASES AND THEIR TREATMENT

one-fifth for a young chicken. Treatment should be repeated as necessary, and animals should be well nursed.

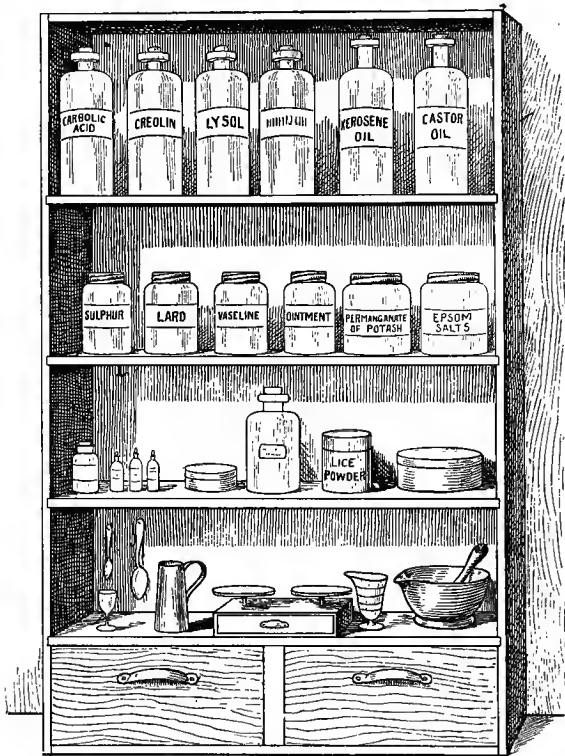


FIG. 4.—POULTRYMAN'S MEDICINE SHELVES

GENERAL METHODS OF CONTROLLING DISEASE

MEDICINE	DOSE OR STRENGTH	DISEASE
<i>Stimulants—</i>		
Brandy	3-10 drops in warm milk	
<i>Aperients—</i>		
Calomel	1 grain	Diarrhea; liver disease. Diarrhea.
Castor oil.....	1 teaspoonful	
Epsom salts.....	20 grains to 50 grains in food or warm water	Constipation; diarrhea; liver disease.
<i>Astringents—</i>		
Chlorodyne	6-12 drops	Diarrhea; dysentery. Diarrhea; dysentery.
Laudanum (relieves pain)	4-6 drops	
<i>Tonic and Febrifuge—</i>		
Quinine	1 grain	Colds; fever; roup.
Aconite	1 drop	
<i>For Worms—</i>		
Turpentine	5 to 10 drops in 1 teaspoonful castor oil	Worms (intestinal).
Santonin	3 to 5 grains	
<i>Antiseptic Washes—</i>		
(a) Carbolic acid	1-5% sol.	Colds; roup; diphtheria; cuts and injuries.
(b) Hydrogen peroxide.	50%	
(c) Creolin	2-5% sol.	
(d) Permanganate of potash.....	½-2% sol.	
<i>Dressing Flesh Wounds—</i>		
½ creolin and ½ sweet oil		Cuts and injuries.
<i>To Reduce Swellings—</i>		
Iodine	Tincture	
<i>Embrocation:</i>		
Turpentine.....	10 drops	Cramp. Rheumatism.
Sweet oil.....	1 ounce	
<i>Insecticides—</i>		
Lice powders		Lice, mites.
Kerosene		Scaly legs.
<i>Sulphur ointment:</i>		
Sulphur	1 part	Lice, scaly legs, mites, ticks.
Kerosene	1 part	
Lard	2 parts	

NOTE.—By accepting that 1¼ teaspoonfuls made up to a pint with water gives approximately a 1% solution, any of the weak dilutions required by poultrymen can be easily prepared.

6. Disinfection

The important part played by micro-organisms in causing and spreading disease must be understood before the value of disinfection can be fully appreciated. The poultryman must develop a sense of sight that sees lurking microbes at every turn, especially in unclean corners. Figure 5 shows germs revealed by the microscope in the excrement of a bird suffering from

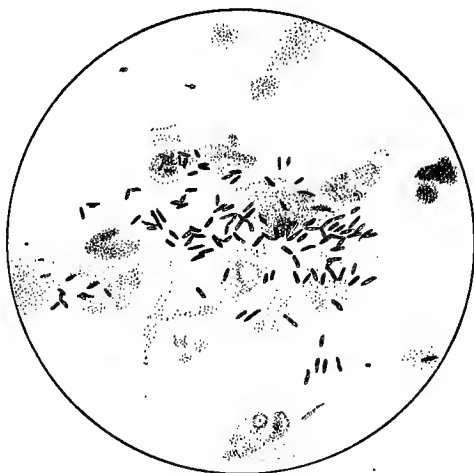


FIG. 5.—HOW DISEASE IS SPREAD
Germs of tuberculosis in the excrement of a fowl. (After Edwards.)

tuberculosis. The fact that this speck contained so many germs, although it was far too small to be seen with the naked eye, will give an idea of how epidemics may be caused by food, water, and soil contaminated by excreta, nasal discharges, etc.

Regular and thorough disinfection of woodwork, of feeding vessels, and of the drinking water should form part of the routine of poultry management, and a stock of disinfectants should always be kept on hand. It will be found convenient to have an iron drum with a tap for a diluted solution, say 5%, of some standard disinfectant—e. g., creolin—that can be further diluted as required.

Water. A stock solution of permanganate of potash, made by adding ten grains to one quart of water, should always be kept on hand for purposes of disinfection. When there is danger of infection, two tablespoonfuls of this solution should be added to every gallon of drinking water.

Feeding Vessels. Clean with boiling water.

POULTRY DISEASES AND THEIR TREATMENT

Houses and Fixtures. Spray with 2% to 5% creolin (or other disinfectant) and whitewash afterwards, or use whitewash to which 2% of creolin has been added. The

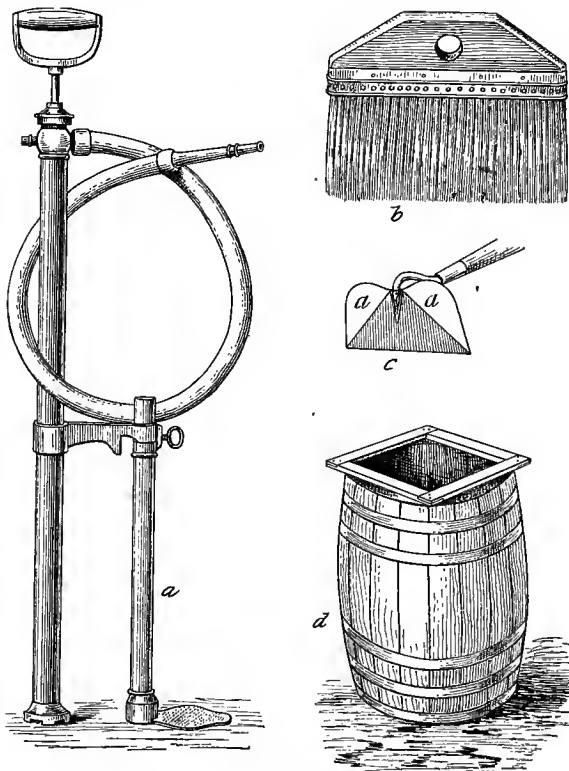


FIG. 6.—AIDS TO THOROUGH DISINFECTION

whitewash should be prepared with quicklime. The house should first be cleaned out with an iron scraper and scrubbing brush, using a liberal supply of water (see Fig. 6).

Soil. The most convenient of the following methods should be adopted:

- (1) Spray surface with 5% creolin.
- (2) Spread straw over ground and set fire to it.
- (3) Fork over and lime. This method is not sufficient if serious contamination is suspected.

CHAPTER II
SUMMARY OF EXTERNAL SYMPTOMS AND TREATMENT

DISEASE	EXTERNAL SYMPTOMS	TREATMENT
<p>1. <i>Diseases affecting head and respiratory organs:</i> Air under skin (see Emphysema).</p>		
Apoplexy	Staggering gait and appearances of a sudden fit	Keep fowl quiet; put in a dark place; give Epsom salts.
Aspergillosis	Loss of weight.....	Avoid musty grain and straw.
Brooder pneumonia	Affects chickens; whitish diarrhea; many deaths	No cure; prevent by strict sanitary methods.
Bronchitis (croup)	Rattling in throat.....	Paint throat with iodine.
Canker (see Roup).		
Catarrh, contagious (see Roup).		
Chicken pox	Scabby, wart-like growths on head and comb	Gently scrape off scab and paint with iodine.
Cold (catarrh)	Running at nose and eyes.....	Isolate and syringe nostrils with 2% carbolic acid.
Congestion of lungs (see Pneumonia)		
Conjunctivitis—sore eyes (see Roup)		
Diphtheria (diphtheritic roup)....	Yellowish patches on throat following an attack of roup.....	Isolate; paint patches with hydrogen peroxide or iodine; best to kill fowl.
Emphysema	Skin puffed out	Puncture with needle.
Epilepsy	Bird has fit	If worms are believed to be the cause give santonin.
Favus	Scurfy patches on comb and upper portion of neck	Anoint with sulphur ointment or iodine.
Frost bite	Frozen wattles	Rub with vaseline.
Influenza—grippe (see Cold).		

SYMPTOMS AND TREATMENT

SUMMARY OF EXTERNAL SYMPTOMS AND TREATMENT—Continued

DISEASE	EXTERNAL SYMPTOMS	TREATMENT
<p>1. <i>Diseases affecting head and respiratory organs</i>—Continued:</p> <p>Roup</p> <p>Pip</p> <p>Pneumonia</p> <p>Sore head (see Chicken pox). Vertigo (see Epilepsy). White comb (see Favus).</p> <p>2. <i>Diseases affecting organs of digestion and reproduction:</i></p> <p>Blackhead of turkeys.....</p> <p>Cancer (see Liver diseases and Ovary diseases). Catarrh of crop..... Catarrh of stomach (see Gastritis). Cholera</p> <p>Cloacitis</p> <p>Constipation</p> <p>Coccidiosis of adult fowls..... Coccidiosis of chickens (see White diarrhea).</p>	<p>Nostrils caked with offensive smelling exudate</p> <p>Hardened scale on tip of tongue.....</p> <p>Great difficulty in breathing.....</p> <p>Drooping wings; dullness; many deaths</p> <p>Distended crop with offensive liquid..</p> <p>Yellow feces; bad diarrhea; sudden death of several birds.....</p> <p>Offensive discharges from cloaca.....</p> <p>Unsuccessful efforts to evacuate.....</p> <p>Loss of weight, diarrhea.....</p>	<p>Isolate; syringe nostrils with 5% carbolic acid; best to kill fowl with bad attack.</p> <p>Soften and remove. Paint shoulders above lungs with iodine; generally incurable.</p> <p>Strict sanitary measures; difficult to control.</p> <p>Empty crop; diet sparingly.....</p> <p>No cure known; kill fowl and burn body; take every precaution to prevent spread.</p> <p>Syringe out cloaca. Give castor oil; supply green food and make bird scratch for grain. No remedies.</p>

SUMMARY OF EXTERNAL SYMPTOMS AND TREATMENT—Continued

DISEASE	EXTERNAL SYMPTOMS	TREATMENT
<p>2. <i>Diseases affecting organs of digestion and reproduction</i>—Continued. Coccidiosis* of turkeys (see Black-head). Crop-bound</p>	<p>Distended crop</p>	<p>Pour sweet oil down throat and knead crop, holding fowl's head down; or slit crop and remove food.</p>
<p>Diarrhea</p>	<p>Frequent passing of liquid excreta; soiled vent</p>	<p>Isolate for fear of epidemics; in bad cases give 6 to 10 drops chlorodyne. Kill bird or puncture abdomen.</p>
<p>Dropsy</p>	<p>Distention of abdomen.....</p>	<p>Treat as for bad cases of diarrhea. Remove egg.</p>
<p>Dysentery</p>	<p>Bad form of diarrhea distinguished by blood in the excreta.....</p>	<p>Change diet of others.</p>
<p>Egg-bound</p>	<p>Unsuccessful efforts to lay.....</p>	<p>Empty stomach; give castor oil and easily digested food.</p>
<p>Enteritis (see Diarrhea).</p>	<p>Sudden death; excessively fat.....</p>	<p>Change diet.</p>
<p>Fatty degeneration</p>	<p>Dulness; loss of appetite.....</p>	<p>One grain of calomel and green food.</p>
<p>Fowl typhoid (see Cholera).</p>	<p>Difficult to diagnose.....</p>	<p>Change diet.</p>
<p>Gastritis</p>	<p>Yellowish comb</p>	<p>No remedies. Vaseline and replace. Aconite and opium. No remedy. Empty crop; diet sparingly.</p>
<p>Impaction of crop (see Crop-bound)</p>	<p>Difficult to diagnose.....</p>	<p>Change diet.</p>
<p>Indigestion</p>	<p>Irregularity in egg production.....</p>	<p>Change diet.</p>
<p>Jaundice</p>	<p>Prolapse of oviduct.....</p>	<p>No remedy.</p>
<p>Leukemia (see Cholera).</p>	<p>Fever; pain in abdomen.....</p>	<p>No remedy.</p>
<p>Liver diseases</p>	<p>No external symptoms.....</p>	<p>Empty crop; diet sparingly.</p>
<p>Ovary diseases</p>	<p>Distended and soft crop.....</p>	<p>Empty crop; diet sparingly.</p>
<p>Peritonitis</p>		
<p>Pyæmia</p>		
<p>Soft crop</p>		

SYMPTOMS AND TREATMENT

SUMMARY OF EXTERNAL SYMPTOMS AND TREATMENT—Continued

DISEASE	EXTERNAL SYMPTOMS	TREATMENT
<p>2. <i>Diseases affecting organs of digestion and reproduction—Continued:</i> Tuberculosis</p> <p>White diarrhea of chickens</p>	<p>Wasting away; lameness.....</p> <p>Dullness; many deaths; whitish diarrhea</p>	<p>Kill affected birds; disinfect poultry houses, etc. Proper feeding; thorough disinfection; difficult to control.</p>
<p>3. <i>Diseases affecting legs and feet:</i> Bumblefoot</p> <p>Cramp</p> <p>Fractures</p> <p>Gout</p> <p>Leg weakness</p> <p>Rheumatism</p>	<p>Swelling on pad of foot.....</p> <p>Difficulty in standing straight.....</p> <p>Broken shank or wing.....</p> <p>Pain in joints of legs and difficulty in standing</p> <p>Unsteady walk</p> <p>Stiffness in joints; difficult to distinguish from cramp and gout.....</p>	<p>Lance, if bad; paint with iodine; lower perches. Hold legs in warm water; rub with embrocation; keep bird in dry place. Splints. Difficult to cure; rub joints with embrocation. Select breeders. Rub legs with embrocation; keep bird in dry place.</p>
<p>4. <i>Parasites:</i> Fleas</p> <p>Cape worms</p> <p>Lice</p> <p>Maggots</p>	<p>On hen and in nest straw.....</p> <p>Gaping of chicks and effort to dislodge something in throat or windpipe</p> <p>Unthrifty condition of birds; desertion of nests by setting hens.....</p> <p>Running wound</p>	<p>Dust with insect powder; burn infested straw. Extract by pushing feather moistened with turpentine down windpipe. Dust fowl with insect powder; grease head and neck of chickens; spray woodwork. Remove maggots; treat with creolin or carbolic acid.</p>

SUMMARY OF EXTERNAL SYMPTOMS AND TREATMENT—Continued

DISEASE	EXTERNAL SYMPTOMS	TREATMENT
<p>4. <i>Parasites</i>—Continued: Mites (air sac)..... Mites (depluming)..... Mites (red)..... Scabies (see Mites, depluming). Scaly leg.....</p>	<p>In bad cases, suffocation..... Bare patches..... Examine roosts at night..... Uneven crusts on legs.....</p>	<p>Difficult to treat. Sulphur ointment. Kerosene. Scrub with soap and water; kerosene oil or sulphur ointment.</p>
<p>Ticks.....</p>	<p>Birds suffering from fever; ticks found on the body, especially at night..... Loss of weight; segments of worms in excreta.....</p>	<p>Remove ticks from fowl; spray perches, etc., with 5% creolin. Give 3 to 5 grains santonin, followed by 2 teaspoonfuls castor oil.</p>
<p>5. <i>Miscellaneous</i>: Abscesses..... Anæmia..... Breakdown..... Egg-eating..... Feather-eating..... Going light (see Anæmia). Heart, diseases of..... Limber-neck.....</p>	<p>Swelling with pus..... Loss of weight and unthrifty condition..... Enlarged and pendulent abdomen..... Remains of eggs..... Injured plumage..... No external symptoms..... Muscles of neck unable to support head.....</p>	<p>Lance and dress with healing oil. Search for cause and treat. No satisfactory treatment. Trap nests. Isolation of culprit. No treatment possible.</p>
<p>Kidney diseases..... Molting..... Poisoning.....</p>	<p>No external symptoms except in gout Unthrifty condition of bird..... Evidence of p.a.n and depression.....</p>	<p>Try purgative to correct cause. No treatment except for gout. Feed up and give tonic. Give milk, white of egg and a stimulant.</p>

CHAPTER III

DISEASES OF POULTRY OTHER THAN FOWLS

ALL classes of domestic poultry are to a great extent subject to the same diseases that affect the common fowl. The symptoms of such diseases are for the most part similar to those noticed when fowls are affected, and treatment must be on the same lines. In the management of turkeys, ducks, geese, guinea fowls and pigeons, the strictest sanitary measures must be enforced, as in the rearing of fowls.

Owing to its importance, blackhead of turkeys is dealt with separately. It is one of the most serious of poultry diseases and causes heavy losses to turkey rearers. Careful study should be made of the reports of the recent investigations at the Rhode Island Experiment Station.

Severe epidemics of diarrhea or cholera occur among all classes of poultry. Geese are subject to a form of cholera that appears

POULTRY DISEASES AND THEIR TREATMENT

to be different from any kind that attacks fowls. Water fowl are not commonly infested with external parasites. Pigeons, on the other hand, are worried by fleas and ticks as well as mites. Smallpox of pigeons is similar to chicken pox of fowls, but pustular swellings may be found on the rump and the cloaca of the pigeon as well as on the head. The scaly leg mite attacks turkeys and the gape worm is sometimes a serious pest of poults. Below is given a list of some of the diseases of turkeys, ducks, geese, guinea fowls and pigeons:

TURKEYS

Blackhead	Roup
Diphtheria	Tuberculosis
Gapes	Scaly leg
Leg weakness	White comb
Lice	Worms
Mites	

DUCKS

Aspergillosis	Diphtheria
Catarrh	Lice
Congestion of lungs	Mites
Cholera	Worms

DISEASES OF POULTRY OTHER THAN FOWLS

GEESE

Aspergillosis	Lice
Cholera	Mites
Congestion of lungs	Worms
Diphtheria	

GUINEA FOWLS

Aspergillosis	Lice
Cholera	Mites
Diphtheria	Worms

PIGEONS

Aspergillosis	Flea
Canker	Lice
Chicken pox (smallpox)	Mites
Diphtheria	Ticks
Dovecot bug	Worms

CHAPTER IV

DISEASES AND PESTS OF FOWLS

- Abscesses.
- Abnormal eggs (see Oviduct diseases).
- Air under skin (see Emphysema).
- Air sac mite (see Mites, air sac).
- Anæmia.
- Apoplexy.
- Aspergillosis.
- Atrophy of liver (see Liver diseases).
- Bacterial enteritis (see Diarrhea).
- Baldness (see Favus).
- Biliary repletion (see Jaundice).
- Blackhead of turkeys.
- Breakdown.
- Broken limbs (see Fractures).
- Bronchitis.
- Brooder pneumonia.
- Bumblefoot.
- Cancer (see Liver diseases and Ovary diseases).
- Canker (see Diphtheria).
- Catarrh (see Cold).
- Catarrh, contagious (see Roup).
- Catarrh of crop.
- Catarrh of stomach (see Gastritis).

DISEASES AND PESTS OF FOWLS

- Chicken pox.
- Cholera.
- Cloacitis.
- Coccidiosis of adult fowls.
- Coccidiosis of chickens (see Brooder pneumonia).
- Coccidiosis of turkeys (see Blackhead).
- Cold.
- Congestion of the liver (see Liver diseases).
- Congestion of the lungs (see Pneumonia).
- Conjunctivitis (see Roup).
- Constipation.
- Cramp.
- Crop-bound.
- Crop, soft (see Soft crop).
- Crop, Catarrh of.
- Depluming mite.
- Diarrhea, bacterial.
- Diarrhea, mycotic.
- Diarrhea, protozoan.
- Diarrhea, simple.
- Diarrhea, severe.
- Diarrhea, white.
- Diphtheria.
- Diphtheritic roup.
- Dislocations (see Fractures).
- Dropsy.
- Dysentery.
- Egg-bound.
- Egg-eating.

POULTRY DISEASES AND THEIR TREATMENT

- Emphysema.
- Enlargement of heart (see Heart, diseases of).
- Enlargement of liver (see Liver diseases).
- Enlargement of kidneys (see Kidney diseases).
- Enteritis (see Diarrhea).
- Entero-hepatitis (see Blackhead).
- Epilepsy.
- Fatty degeneration.
- Favus.
- Feather-eating.
- Fits (see Epilepsy).
- Fleas.
- Fowl typhoid.
- Fractures.
- Frost bite.
- Gangrenous Ovary (see Ovary diseases).
- Gapes.
- Gastritis.
- Going light (see Anæmia).
- Gout.
- Grippe (see Cold).
- Heart, diseases of.
- Heart, dropsy of.
- Heart, enlargement of.
- Heart, rupture.
- Hypertrophy of the liver (see Liver diseases).
- Impaction of the crop (see Crop-bound).
- Indigestion.
- Influenza (see Cold).

DISEASES AND PESTS OF FOWLS

Jaundice.
Kidney diseases.
Leg weakness.
Leukemia (see Cholera).
Lice.
Limber-neck.
Liver diseases.
Lungs, congestion of (see Pneumonia).
Maggots.
Mites, air sac.
Mites, depluming.
Mites, red.
Mites, scaly leg (see Scaly leg).
Molting.
Nodular tæniasis (see Worms).
Ovary diseases.
Oviduct diseases.
Peritonitis.
Pip.
Pneumonia.
Poisoning.
Prolapse of oviduct (see Oviduct diseases).
Puffed skin (see Emphysema).
Pyæmia.
Rheumatism.
Roup.
Scabies (see Mites, depluming).
Scaly leg.

POULTRY DISEASES AND THEIR TREATMENT

Soft crop.

Sore head (see Chicken pox).

Ticks.

Tuberculosis.

Vertigo (see Apoplexy).

White comb (see Favus).

White diarrhea of chickens.

Worms.

ABSCESSSES

Not a common poultry complaint

Symptoms. The flesh becomes inflamed and swollen and forms a "head" containing pus.

Cause. A scratch or a small injury followed by inflammation due to pus-forming organisms.

Treatment. Lance the abscess when "ripe" with a clean, sharp knife, cutting low so that the sore may drain readily. Squeeze out the pus; wash with 1% carbolic acid or creolin and dress with creolin and sweet oil (half and half) until healed.

The most common abscess is that which forms on the pad of the foot and develops into bumblefoot.

DISEASES AND PESTS OF FOWLS

ANÆMIA, OR GOING LIGHT

A condition that should incite the poultryman to investigate the cause

Symptoms. Birds lose weight, or "go light," without any apparent reason.

Cause. A general lack of thriftiness in the flock may be due to insufficient or poor food, to lack of exercise, or to bad ventilation of houses; lice or mites may be infesting the birds. On the other hand, birds may gradually lose weight as the result of some such disease as tuberculosis (see page 90, aspergillosis (see page 29), or worms (see page 94).

Treatment. Make any changes in feeding or management that may appear desirable. Search at night for mites or lice on the birds; in the daytime examine the straw in nest boxes, the roosts, and the cracks and crevices of the woodwork for parasites. Much time may often be saved in discovering what is wrong with the flock by killing one or more of the affected birds

and making a post-mortem examination to discover if a specific disease is the cause.

APOPLEXY

Not a common trouble

Symptoms. Staggering gait and bewildered appearance; bird generally drops dead suddenly.

Cause. Attributed to high feeding or over-laying.

Treatment. There is usually no time for treatment, but if the attack is mild, put the bird in a dark place and give no food for a few hours; give a dose of Epsom salts and add green food to diet. Bleeding from under a wing is sometimes tried.

Post-mortem examination shows clotted blood on the brain, the other organs being normal.

The name vertigo is applied to congestion of the brain as distinct from apoplexy due to hemorrhage of the brain. The fowl has fits. It is difficult to distinguish this disease from epilepsy (see page 55). The cause is little understood.

DISEASES AND PESTS OF FOWLS

ASPERGILLOSIS

A disease that exists more commonly than is usually suspected, and is the cause of the death of large numbers of young chickens

Symptoms. Fowls gradually lose weight, mope, and die without any pronounced ailment except difficulty in breathing. In adults the disease may be mistaken for tuberculosis and in chickens for white diarrhea. Aspergillosis of chickens is dealt with under brooder pneumonia. Post-mortem symptoms are whitish or yellowish growths on the windpipe, that can only be definitely diagnosed under the microscope.

Cause. A fungoid growth in the windpipe and bronchial tubes, sometimes extending to the lungs and liver. Fig. 8 shows the spores and filaments of the species of aspergillosis most commonly responsible

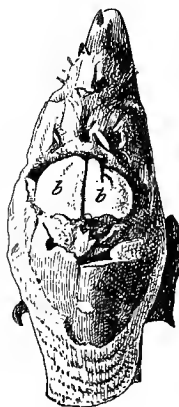


FIG.7.—HEAD SHOWING
BRAIN EXPOSED

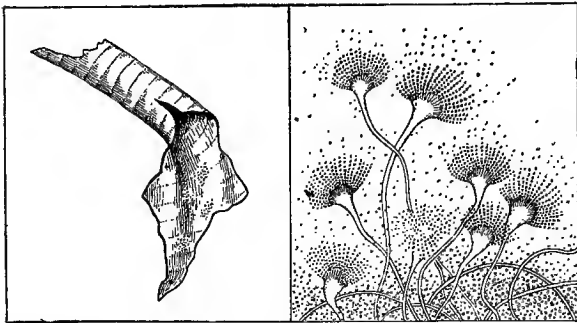


FIG. 8.—ASPERGILLOSIS

On left—Windpipe cut open. On right—A fungus that causes aspergillosis

for this disease. Infection may be due to musty grain or dirty straw.

Treatment. No medicines are of any avail. Protection lies in not using musty grain or moldy litter. Burn dead birds.

BLACKHEAD OF TURKEYS

A very serious disease, making the successful rearing of turkeys difficult and in some cases impossible

Symptoms. Young turkeys, or poults, are most commonly attacked; there is loss of weight and loss of appetite; the bird appears listless and stands by itself with

drooping wings and tail. Diarrhea is generally one of the symptoms. The comb often turns a dark purple—a symptom that has given rise to the name blackhead. Death generally follows an attack fairly rapidly, but in some cases the disease may take a chronic form, while it is believed that recovery is occasionally effected.

Post-mortem symptoms. The cæca (see Fig. 32) are enlarged, are diseased in parts, and are more or less plugged with cheesy matter and pus. The liver is diseased, being sometimes very much enlarged and covered with yellowish necrotic areas, generally depressed in the centre (see Fig. 24*d*). In cases of an acute attack, especially in young birds, one of the cæca only may be affected and the liver may not be invaded. The extent of the necrotic areas and the degree of the enlargement of the infected organs may vary greatly in different cases.

Cause. The cause of blackhead has been shown by Drs. Cole and Hadley to be a coccidium. A full account of their work is published in Bulletin 141 of the Rhode

Island Experiment Station. *Coccidia* enter the digestive tract of the healthy turkey by means of food or water infected by the excrement of a sick bird. The organisms pass along the alimentary canal until they reach the cæca, the lining of which they attack, giving rise to the conditions mentioned under post-mortem symptoms. How the infection spreads from the cæca to the liver is not clear.

It has been conclusively proved that fowls, as well as pigeons, sparrows, etc., act as hosts for these parasites. Although adult fowls have a great degree of resistance themselves, they are a means of carrying infection to turkeys.

Eggs may be one of the means of spreading the disease, as they may become contaminated in the oviduct or the cloaca of birds affected with blackhead.

Treatment. No remedy or satisfactory method of prevention has been discovered: The difficulty of effecting a cure is obvious when the nature of the disease is con-

DISEASES AND PESTS OF FOWLS

sidered. Drs. Cole and Hadley summarize measures of prevention as follows:

1. Protect the yards and flocks which may have the good fortune to be uninfected with the blackhead organism by a thorough examination of all new stock, whether turkeys, fowls, geese or other domestic birds.

2. Keep the turkeys on grounds which are as fresh as can be obtained, and above all, keep them isolated from fowls and other domestic birds.

3. Keep every turkey in the flock under close observation in order to separate and at once isolate any bird which gives evidence of the disease. To facilitate such observations it is helpful to leg-band each individual, and to record its weight from time to time. Such a course makes it possible to learn whether any birds are losing weight, and if this is the case, these birds must be regarded with suspicion, and separated from the rest of the flock.

4. If it is known that blackhead is present in any of the poultry, the yard should be kept free from English sparrows, and the poultry houses and grain boxes from rats and mice, which have been shown to carry the causative organism.

5. When it is desired to fatten birds for the market, begin to increase the rations gradually. Never attempt to fatten birds which, in successive weighings, show a loss of weight. Overfeeding does not cause blackhead, but frequently causes the sudden death of birds in which blackhead is present.

6. When birds have died of blackhead, their bodies should be promptly burned or buried in order to prevent the dissemination of the coccidia, either through the ravages of rats or skunks, or consequent to the natural processes of decay.

BREAKDOWN

Not often seen in the poultry yard

Symptoms. The abdomen becomes en-

larged, hangs down at the back, and sometimes touches the ground.

Cause. Old layers are generally affected. The cause may be the strain of heavy laying, or may in cases be due to too much internal fat.

Treatment. No satisfactory treatment can be recommended and the bird had best be killed. Such birds should not be used for breeding purposes.

BRONCHITIS (CROUP)

Not very common

Symptoms. Bronchitis may be distinguished by the rattling in the throat of the bird affected and by the rapid breathing and cough. The rattling is due to mucus in the inflamed bronchial tubes. In bad cases, birds mope, refuse to eat, and soon die.

Cause. Bronchitis may develop from an ordinary cold, or may be due to sudden changes of temperature, or to exposure to rain, cold, and damp.

Treatment. Keep affected bird away

DISEASES AND PESTS OF FOWLS

from drafts and in a warm place; dose with Epsom salts (see page 9) and give soft food, e. g., bread, bran, and middlings, with milk. Wine of ipecacuanha has been recommended for cases in which breathing is very difficult owing to excessive inflammation.

BROODER PNEUMONIA

A very serious disease, causing the death of many chickens

Symptoms. Chickens affected stand by themselves with roughened plumage. There is a whitish diarrhea, and this disease can easily be mistaken for white diarrhea. (See page 92.) Post-mortem examination will show yellowish spots on the lungs, on the walls of the air sacs, and on the liver and other organs, due to infection by the aspergillus fungus. (See page 29.)

Cause. Infection by a species of the aspergillus fungus, the spores of which are probably inhaled. This fungus is common. The spores may be in the straw used for nests or for litter, or in the food, especially if it is at all moldy.

Treatment. There is no cure for an affected chicken, and the poultryman must aim at prevention. Vigorous sanitary measures are imperative. Clean straw or excelsior should be used for nests; eggs for hatching should be disinfected by wiping with 80% alcohol; incubators and brooders should be thoroughly disinfected:

BUMBLEFOOT

Not serious if treated early

Symptoms. Lameness with swelling on pad of foot.

Cause. Injury to sole of foot, developing



FIG. 9.—BUMBLEFOOT

DISEASES AND PESTS OF FOWLS

into an abscess. Heavy birds are more subject than light ones to bumblefoot, especially if made to roost on perches that are too high.

Treatment. Paint with iodine. Lance the abscess if it is sufficiently advanced. Lower perches. Birds under treatment should have their feet bandaged, and should be put on deep straw to prevent further injury while the wounds are healing. Not serious if taken in hand promptly.

CATARRH OF THE CROP

Not a common trouble

Symptoms. Distention of crop with soft pasty matter of a more or less offensive character.

Cause. Eating stale, putrifying food or some poisonous matter.

Treatment. Empty the bird's crop by holding the head downwards and gently pressing the contents out through the mouth. Feed sparingly on soft food.

POULTRY DISEASES AND THEIR TREATMENT

CHICKEN POX OR SORE HEAD

An infectious disease that causes considerable loss among chickens and young birds in warm climates

Symptoms. Small, scabby, wart-like growths and eruptions on the head, especially on the comb and the wattles and around the eyes—in bad cases extending to the lids and even the mouth. Chickens and young birds are most commonly attacked by this disease, which spreads rapidly.



FIG. 10.—CHICKEN POX

Cause. The specific organism has not been definitely determined. Chicken pox may be started by the introduction of an

DISEASES AND PESTS OF FOWLS

infected bird, and mosquitoes and other insects are suspected of being agents in its spread.

Treatment. Prompt treatment may be very successful. Isolate affected birds. Apply tincture of iodine, first scraping off the scabs. Creolin 2%, or other disinfectants, may be used instead of iodine. Dirty coops are a contributing cause, and cleanliness of chicken runs and houses is important. Disinfect soil (see page 13) and woodwork (see page 12) regularly and with extra care when the first cases are noticed. When roup lesions develop, as is sometimes the case, treat as for roup. (See page 83.)

CHOLERA

A serious and epidemic form of diarrhea for which no remedy is known

Symptoms. Fowls die suddenly with apparently little reason. There are symptoms of diarrhea and examination shows that the feces are a bright yellow or green instead of the normal color. Before death, fowls have fever and may be seen moping

and showing evidences of distress. For post-mortem symptoms see page 112.

Cause. A contagious disease, due to bacteria, that, owing to infection of soil and drinking water by birds suffering from the disease, spreads rapidly through a flock. It is often introduced by the purchase of an infected bird that appears at the time of purchase to be well.

Treatment. Prevention by strict sanitary measures is what must be aimed at. It is believed that no cure is known for genuine cases of cholera. Isolate all new birds brought into the flock, especially when cases of cholera are reported in the neighborhood. The bodies of birds that have died of this disease are best burnt without delay. The germ of cholera appears to be both persistent and easily spread, and too much stress cannot be laid on the necessity of preventing its introduction, failing that, of quickly stamping it out. The sacrifice of a few birds to prevent the spread of the disease will be well repaid, for it has been necessary on occasions to kill a whole flock.

DISEASES AND PESTS OF FOWLS

In some cases it has been found best to move unaffected birds to new quarters.

Fowl typhoid, or leukemia, is a disease of the blood that may be mistaken for cholera. The poultryman must treat it in the same way.

CLOACITIS OR VENT-GLEET

Not a common disease

Symptoms. Frequent small discharges of excrement and unsuccessful efforts to discharge when the cloaca (Fig. 32) is empty, the mucous membrane of which becomes hot and inflamed. These symptoms are soon followed by an offensive discharge.

Cause. A specific disease transmitted from hen to hen by the agency of the cock.

Treatment. Immediately isolate affected hens; syringe out cloaca twice daily with 2% creolin; give mild purgative and put on soft food. Males likely to be affected should be examined, and diseased birds killed.

Caution. The hands should be carefully

cleansed and disinfected, as a serious inflammation will result if the eyes are rubbed with infected hands. This is a troublesome and risky disease to treat.

COCCIDIOSIS OF ADULT FOWLS

The germ of this disease does not usually affect adult fowls seriously, but causes severe losses among chickens and turkeys

Symptoms. The external symptoms are not very pronounced; there is loss of weight and in some cases diarrhea. The disease may last for a long time and birds may even recover. A post-mortem examination shows the walls of the cæca thickened and filled with a pasty mass, while characteristic whitish or yellowish spots (see Fig. 24, *d*) are found in the liver.

Cause. This disease is due to the same germ (a coccidium) that causes blackhead in turkeys. Adult fowls occasionally develop this disease, but appear to be able, as a rule, to act as a host for the germs without being themselves affected, although heavy

losses occur among turkeys or chickens that get the germ from them.

Treatment. Copperas in the drinking water (three grains to a quart) has been recommended, together with the occasional use of calomel in one-grain doses, or one or two teaspoonfuls of castor oil. Thorough disinfection (see page 10) of houses and runs, etc., where affected fowls have been, is important. Burn the bodies of birds that die of the disease.

COLD (SIMPLE CATARRH)

Dangerous, because it may be confused with the early stages of roup

Symptoms. Discharge from the nostrils and the eyes, with occasional fits of sneezing; loss of appetite, and moping.

Cause. Cold and damp. Colds most frequently occur in wet weather and among poorly housed and poorly fed stock.

Treatment. Warm housing and protection from cold and wet. Give quinine—one grain to an adult fowl. Many believe in dosing fowls suffering from colds with

red pepper given in the food. When there are signs of stuffiness, the eyes and the nostrils should be washed out once or twice daily. Carbolic acid 2%, or boric acid, about 3%, dissolved in water, is recommended for this purpose. Witch hazel has been found very effective.

Caution. There is a risk of mistaking the early stages of roup for a simple cold. Further, birds are more likely to contract roup when suffering from a cold, and should, on this account, be isolated and regularly examined.

Influenza. The term influenza, or grippe, is generally applied to a severe cold that has no symptoms of roup.

CONSTIPATION

Not common and seldom serious

Symptoms. The bird suffering is dull and listless. Its efforts to evacuate are painful and unsuccessful.

Cause. Internal blocking of the cloaca or the intestines, or, occasionally, of the

DISEASES AND PESTS OF FOWLS

vent by dirt accumulated on the outside. Want of exercise and lack of green food are held to be contributing causes.

Treatment. If constipation is due to dirt on the outside, cleanse vent by swabbing with warm water. When stoppage is inside and can be felt through the vent syringe with sweet oil. In other cases, give a purgative such as castor oil or Epsom salts. If worms are suspected as the cause, give santonin (see page 9), followed by a teaspoonful of castor oil.

CRAMP

Must not be confused with more serious complaints

Symptoms. Difficulty in standing and lameness, due to inflammation of muscles and joints.

Cause. Damp and cold.

Treatment. Put legs of bird in warm water; rub joints with embrocation and put in dry quarters.

NOTE—In cases of rheumatism, tick fever,

POULTRY DISEASES AND THEIR TREATMENT

and tuberculosis, birds may show the same difficulty in standing that they do in cramp.

CROP-BOUND (IMPACTION OF CROP)

Not serious, as a rule

Symptoms. The crop is hard and swollen.

Cause. The blocking of the passage from the crop to the gizzard by a bit of stick or a stone, with the result that the food cannot pass out of the crop.

Treatment.—Pour sweet oil down fowl's throat; work the crop with the fingers, endeavoring to remove the obstructing object. If unsuccessful, cut open the crop and remove the contents, making sure that the opening into the gizzard is clear. Sew up the cut made, stitching separately first the inner skin and then the outer.

DIARRHEA OR ENTERITIS

May take a serious and epidemic form

Diarrhea is a common complaint among fowls, and in some cases takes a severe and

epidemic form. The latter form may be due to various causes, and it will be best, perhaps, to deal with diarrhea under the following heads:

1. Mild diarrhea.
2. Epidemic and severe diarrhea.
3. Dysentery. (See page 52.)
4. Cholera. (See page 39.)
5. White diarrhea of chickens. (See page 92.)

Mild Diarrhea

Symptoms. Looseness of bowels and staining of feathers around the anus with excreta.

Cause. Indigestion 'caused by food which may be too laxative; e. g., excess of bran, or, by food which may be partly decomposed or may contain an intestinal irritant. Cold may also be a cause.

Treatment. Give Epsom salts, or castor oil. (See page 9.) Change diet if food is suspected. Often no treatment is necessary, but it is not wise to neglect cases that are apparently mild diarrhea, for fear they

may turn out to be an epidemic and contagious form.

Diarrhea, Severe and Epidemic

Symptoms. Excessive looseness of bowels, ruffling of feathers, depression, loss of appetite. A number of birds in the flock are attacked and death results.

Cause. There are a variety of causes. Scientific investigation has led to the discovery of specific organisms responsible for various forms of diarrhea. It would be well for poultry rearers to study the results of such work, but, for the purposes of this book, it will be sufficient to state that the causal organism may be bacterial, mycotic, or protozoan. The owner of poultry will not usually be able himself to determine what type of diarrhea the fowls are suffering from, but as a rule the treatment will have to be the same. Advice will have to be sought from an expert when dangerous epidemics are feared.

Treatment. The most energetic meas-

DISEASES AND PESTS OF FOWLS

ures of disinfection must be undertaken.
(See page 10.)

1. Isolate sick fowls.
2. Disinfect soil of run thoroughly.
3. Clean and disinfect coops.
4. In bad cases, remove the rest of the flock from the infested run.
5. Give sick fowls Epsom salts, or castor oil; feed fowls on soft food.
6. If the diarrhea is not checked, give 6 to 12 drops of chlorodyne.

DIPHTHERIA OR DIPHTHERITIC ROUP

A dangerous disease, and infected birds should be killed at once

Symptoms. A cold, accompanied by whitish and yellowish patches on the back of the throat and in the mouth. These patches apparently form a false membrane and cannot be torn off without causing bleeding. The disease is sometimes known as canker.

POULTRY DISEASES AND THEIR TREATMENT

Cause. This disease is often clearly a later stage of roup. It is difficult to say where one ends and the other begins. It has been claimed that the organism is the same as that which causes diphtheria in

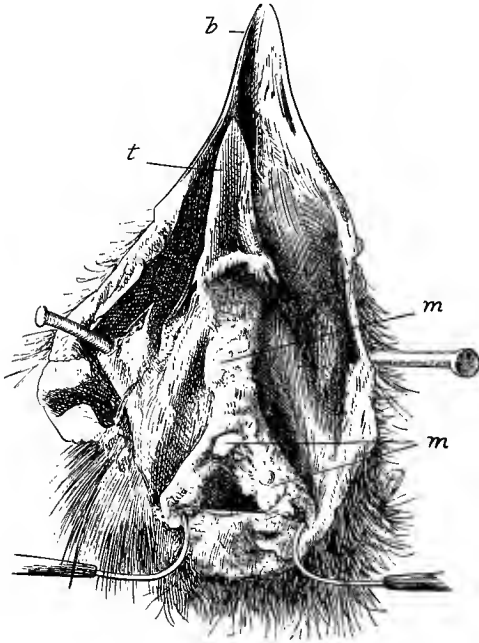


FIG. 11.—DIPHThERITIC ROUP

b, lower beak; *t*, tongue; *m*, false membrane.
(After Harrison and Streit.)

human beings, but the weight of evidence is against this conclusion.

Treatment. Diphtheria is extremely infectious. It is best to kill the first cases at once. If the bird is of particular value, it may be isolated and the patches on the throat swabbed with 50% hydrogen peroxide or 5% creolin, with a small bit of cotton wool wound around a stick. If great care is exercised, 20% carbolic acid or 20% creolin may be painted on the patches, but neither should be allowed to touch the normal skin. Burn the swabs. Treat accompanying roup symptoms as recommended under roup.

The term canker is also applied to certain spots or growths that occur on the throat. These are not in any way associated with diphtheritic roup, or any dangerous, contagious disease, and are due to injury or to an unhealthy condition of the mucous membrane.

POULTRY DISEASES AND THEIR TREATMENT

DROPSY

Not a common disease.

Symptoms. Distention of abdomen.

Cause. Collection of liquid in abdominal cavity.

Treatment. Treatment is seldom successful. It is best and most merciful to kill the afflicted bird. If it is desired to make an effort to save the bird, carefully puncture the lower portion of the abdomen with a trocar and squeeze out the liquid. Give invalid diet.

DYSENTERY

Serious if in epidemic form

Symptoms. Severe diarrhea with blood in the discharges.

Cause. Bacterial or other specific infection of the intestines. Occasionally the eating of some poisonous or irritating substance will give rise to blood in the excrement.

Treatment. Isolate bird, and give six to eight drops of chlorodyne on a small piece

DISEASES AND PESTS OF FOWLS

of bread. Thorough disinfection (see page 10) of water, soil and house is necessary to prevent this disease spreading.

EGG-BOUND

An uncommon complaint

Symptoms. The hen goes on and off the nest straining to lay. Generally the egg may be felt through the vent. After straining for some time, she may succeed in laying the egg, and treatment should not be undertaken until it is evident that the fowl needs assistance.

Cause. Very young hens are more liable to this complaint, which arises from eggs of an abnormal size, from lack of muscular power, or from some other disorder of the oviduct.

Treatment. It will be most merciful to kill fowls in much distress, as treatment is tedious and painful to the fowl. It has been recommended to hold the fowl's vent over steam from boiling water and then to pass an oiled finger up the vent. In bad

cases, pierce the egg and withdraw the contents, then break the shell and remove all the pieces. Great care must be taken to leave no particle of the broken shell behind.

EGG-EATING

A bad habit that may be controlled

Symptoms. If remains of eggs are seen in nests or runs, the poultryman should become suspicious and make observations to prove whether any of his flock are eating eggs.

Cause. Broken eggs or soft-shelled eggs left about the yard may be the cause of hens acquiring this bad habit.

Treatment. All signs of broken eggs should always be immediately removed. The culprit, when detected, should be removed to a different pen and nest. Dark nests have been recommended. A trap nest will prevent a hen from getting at her egg.

EMPHYSEMA (AIR UNDER SKIN)

Not a common disease of chickens

Symptoms. In this disease of chickens

DISEASES AND PESTS OF FOWLS

the skin becomes puffed out in one or more places, generally on the neck. In rare cases the puffing spreads over nearly the whole of the body.

Cause. This disease is evidently caused by some obstruction of the air passages that forces the air to escape under the skin.

Treatment. Let out the air by puncturing the skin. Give soft and nourishing food. It will probably be wiser not to use birds that recover from this complaint for breeding stock.

EPILEPSY

An unusual complaint

Symptoms. The bird staggers about and has a fit. It may recover.

Cause. It is difficult to discover a cause; intestinal worms are suspected in some cases.

Treatment. If it is suspected that intestinal worms are responsible, try the treatment recommended for worms. (See page 95.)

POULTRY DISEASES AND THEIR TREATMENT

FATTY DEGENERATION

Not contagious, but pointing to error in diet

Symptoms. More or less sudden deaths of birds in good condition. Post-mortem examination shows an enlarged liver and masses of fat attached to the intestines.

Cause. Something wrong with the diet; too much heat-giving food and want of exercise.

Treatment. Post-mortem proof of fatty degeneration in the flock should lead the poultry owner to change the diet, reducing the amount of heat-giving food, and giving more exercise. Some authors draw attention to a fatty degeneration in which the liver is shrunken and shows fat globules under the microscope.

FAVUS (WHITE COMB)

Disfiguring, but easily controlled if treated early

Symptoms. Whitish scabs or crusts on the comb, the head and down the neck.

Cause. Due to a fungus that spreads, if

DISEASES AND PESTS OF FOWLS

not treated, and that probably starts where there is an abrasion of the skin.

Treatment. Treat in early stages of the disease by dressing with sulphur ointment. (See page 9.) Isolate bird. If the case has been neglected and allowed to develop, the crusts must first be moistened with oil and the surface scraped off with a blunt instrument. Then apply tincture of iodine or nitrate of silver.

FEATHER-EATING

Not a very common habit

Symptoms. The presence of bare patches and injured plumage on birds should lead the poultryman to watch for feather-eaters.

Cause. Irritation from insects, some defect in diet, or natural cussedness.

Treatment. Isolate the offender, and, if persistent and of no special value, kill, for fear the bad example may be followed by others. If several fowls develop this vice, try hanging up a bone for them to peck at and thus distract their attention.

POULTRY DISEASES AND THEIR TREATMENT

FLEAS

An occasional parasite of poultry

Symptoms. Fleas are found on the fowls or in the straw of their nests.

Description. The flea that attacks fowls is known as the hen flea (*Pulex gallinæ*). It is dark colored and has sharp mouth parts. Doubtless it causes the fowl it attacks much irritation in addition to loss of blood.

Treatment. Keep poultry houses in a clean, sanitary condition. Dust the infested fowls with an insect powder or dip them in creolin, about 1%. Burn infested straw.

FRACTURES

Broken bones of legs or wings can be mended by placing the bones back in their proper positions and binding with light splints. The splints may be removed in about four weeks. It will be found that shanks are easily set, but that broken wings give far more trouble.

DISEASES AND PESTS OF FOWLS

If a fowl dislocates its leg or its wing, the joint should be gently pushed back into place.

FROST BITE

A strain on the bird's system

Symptoms. Combs and wattles are most liable to frost bite, particularly in breeds in which these parts are large.

Cause. Exposure to very low temperatures, especially if birds are suddenly turned out from warm quarters; dipping comb and wattles in water when the temperature is low.

Treatment. Prevent by keeping birds as warm as possible during winter, and do not allow them to go out early in the mornings in very cold weather. Drinking water should be provided in a vessel from which birds can drink without wetting their wattles. In a case of frost bite, thaw the affected parts by gently rubbing with vaseline and afterwards treat with a mixture of

two grains of salicylic acid to one ounce of vaseline or lard.

GAPES

Serious in badly infested yards

Symptoms. Frequent gaping and coughing; young chicks attacked, as a rule.

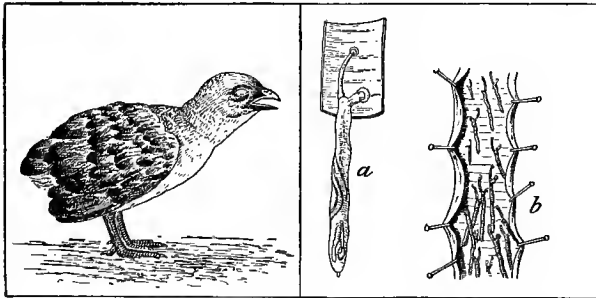


FIG. 12.—GAPES

On left: Chicken affected with gapes. On right: *a*, male and female gape worms; *b*, gape worms in windpipe. (From Salmon.)

Notice if any worms are coughed up by the chicken; if none can be found, but the gaping continues, put a stripped feather down the windpipe, as recommended under treatment, and see if any gape worms can be pulled up.

DISEASES AND PESTS OF FOWLS

Cause. Small worms, red in color when engorged, which attach themselves to the mucous membrane of the windpipe. Affected birds cough up worms or ova, which infect the yard and sometimes the water supply. Earthworms taken from infested yards have been found to contain portions of gape worms, and may be one means of infecting poultry.

Treatment. Isolate attacked poultry and disinfect coops and yards. The worms may be extracted from the windpipe of a gaping chicken with a feather stripped nearly to the end, and moistened, but not dripping, with oil of turpentine. Hold the mouth open, push the feather down the windpipe, and give it a sudden twist, which will dislodge the worms and allow of their being drawn up. Fumigation by holding the bird's head over an irritant vapor, such as that of carbolic acid poured into boiling water, is risky, but sometimes successful. If not cautiously done, much suffering may be inflicted on the bird.

Post-mortem. Cut open the windpipe

and look for the worms, which may be easily recognized by Fig. 12. Male and female specimens will be found attached to one another.

GASTRITIS (CATARRH OF THE STOMACH)

Not a common complaint

Symptoms. This disease cannot be readily diagnosed while the fowl is living; it is generally associated with catarrh of the crop. (See page 37.) The symptoms are similar. Post-mortem examination will show the lining of the stomach in an inflamed condition.

Cause. The inflammation of the lining of the stomach is generally due to eating decomposing food or other poisonous matter.

Treatment. Empty the crop as recommended under Catarrh of the crop. Give one or two tablespoonfuls of castor oil and feed on soft and easily digested food with milk or barley water. Be sure that poultry are not allowed to run under trees that have been sprayed with arsenical poisons.

DISEASES AND PESTS OF FOWLS

GOUT

Not a common ailment

Symptoms. The bird sometimes loses weight, and as the disease develops shows stiffness and an indisposition to stand. In some cases small nodules containing crystals of urate of soda occur on the underside of the toes.

Cause. Failure of the kidneys to perform their normal functions and consequent accumulation of urates in the bird's system in excessive quantities. Gout may be due to too concentrated feeding.

Treatment. Medicines and treatment are of little avail. Endeavor to prevent by feeding a mixed diet.

Post-mortem. In one form of this disease, known as visceral gout, the liver and other abdominal organs are covered over with a powder-like deposit of the crystals of urate of soda.

HEART DISEASES

Not common, and cannot be treated

The heart is an organ that is subject to

several serious diseases, but these cannot be detected with any certainty while the bird is living, and treatment cannot be recommended as likely to be successful. Post-mortem examination may show the following symptoms:

1. The heart sac full of serous liquid, in the case of pericarditis, or dropsy of the heart sac.
2. A reddening of the membrane lining the heart, in the case of inflammation (endocarditis).
3. An enlarged heart, in the case of enlargement of the heart.
4. Hemorrhage, in the case of rupture of the heart and of the blood vessels.

INDIGESTION

Disorder of the intestinal tract, that is not very serious

Symptoms. The bird mopes and shows signs of a capricious appetite. Either diarrhea or, less commonly, constipation, may be a symptom.

DISEASES AND PESTS OF FOWLS

Cause. Disorders of the digestive tract, due to error in dieting—for example, over-feeding, or too little green food and not enough exercise.

Treatment. Alter the feeding, see that the water is clean, and give a dose of Epsom salts. (See page 9.)

JAUNDICE

Not a common disease

Symptoms. A yellow comb may indicate jaundice, but there are no definite external symptoms. Post-mortem examination shows distention of the gall bladder, due to an excessive secretion of bile.

Cause. Said to be due to continued congestion of the liver, arising possibly from too much heat-giving food.

Treatment. If the disease is suspected, give one grain of calomel as a purgative and feed on more green food.

KIDNEY DISEASES

With the exception of gout, kidney diseases cannot be detected by external symptoms

Gout (see page 63) is the commonest dis-

ease of the kidneys. In addition, there are some disorders of the kidneys (e. g., enlargement) that may be noticed on post-mortem examination. Little is known about these diseases; there are no symptoms that can be recognized before death, and no treatment can be recommended.

LEG WEAKNESS

Constitutional weakness, to which the heavier breeds are more subject than are the lighter ones

Symptoms. Fowls walk in an unsteady manner, without showing any specific cause for lameness. Young birds are more likely to be affected in this manner, particularly those of the heavier breeds.

Cause. Too rapid growth, the bird outgrowing the strength of its legs.

Treatment. Reduce the quantity of fat-producing foods. Care in the selection of breeding stock is important.

LICE

Invariably present in small numbers, and likely to become a serious pest, if not persistently controlled

Symptoms. Unthrifty look of fowl and

DISEASES AND PESTS OF FOWLS

signs of irritation; desertion of nest by setting hens; and, of course, the detection of lice on the fowl: this may be done by



FIG. 13.—LOOKING FOR LICE

quickly turning over the feathers on the body and looking for the lice.

Cause. Introduction of an infested

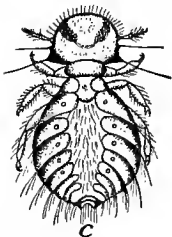
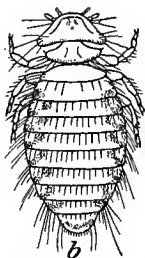


FIG. 14.—THREE LICE
THAT COMMONLY
AFFECT FOWLS
(From Salmon.)
a, *Lipeurus variabilis*.
b, *Menopon pallidum*.
c, *Goniodes dissimilis*.

fowl; neglect to dust fowls regularly to keep down lice, and to clean out fowl houses and change the straw of nest boxes. At the season that lice are likely to be most prevalent the poultryman should take precautionary measures.

Description of lice. Lice are small insects ranging in size from 1-25 to 1-8 of an inch. They breed rapidly, laying their eggs on the feathers. They are not blood-sucking insects, but cause much irritation to the birds they infest.

Several species are found on fowls. Fig. 14 shows three of the common species.

Treatment. Dust fowls with fresh insect powder (pyrethrum). Smear sulphur ointment on head and

DISEASES AND PESTS OF FOWLS

under wings, especially in the case of chickens. Infested fowls may be dipped in 2% creolin. Dust setting hens with a lice powder before putting them on their nests. Infested straw should be burnt, and boxes, nests, fixtures, etc., should be thoroughly sprayed with 2% creolin.

LIMBER-NECK

An occasional complaint

Symptoms. The muscles of the fowl's neck become so relaxed that they cannot support the head.

— *Cause.* Limber-neck, due to partial or entire paralysis of the muscles of the neck, is believed to be associated with acute indigestion or worms.

Treatment. A strong purgative may be the means of effecting a cure by cleaning out any intestinal poisons and thus correcting the cause. If the treatment recommended does not effect a cure in a few days, kill the bird.

LIVER DISEASES

The liver is affected by several diseases, and the poultryman, who finds a spotted liver on post-mortem examination, will be much aided in determining the cause, if he takes into consideration the symptoms noticed before the fowl died, as well as the changes in the other internal organs. The importance of the post-mortem examination is in distinguishing whether the death of the fowl is due to a contagious disease.

The causes of diseased livers may be conveniently divided into two classes:

1. Diseased livers due to indigestion, e. g., enlargement.
2. Diseased livers due to a specific disease, e. g., tuberculosis.

Diseases Due to Indigestion

In this class may be included degeneration, inflammation, congestion, enlargement, and atrophy of the liver. There are more or less distinct differences in these diseases, but the only possible methods of treatment

known at present are very much the same.

Symptoms. There are no definite external symptoms. The poultryman's suspicions should, however, be aroused if fowls apparently in good health die suddenly. A post-mortem examination will reveal a liver of abnormal size, or somewhat shrunken, and of unhealthy texture.

Cause. The cause is generally something wrong in the feeding. Fowls may be eating too large a proportion of heat-producing foods and not enough green food. If an enlarged liver is associated with an excessive layer of fat covering the internal organs, it points to too large quantities of carbohydrates.

Treatment. Correct errors in feeding. Give more green food and let the fowls scratch for some of their grain. If errors in feeding and general management are not obvious, make experimental changes.

Diseased Livers Due to Specific Diseases

Tuberculosis, coccidiosis, gout and other specific diseases are responsible for spotted

or diseased livers. (Fig. 24.) The section on diagnosis by post-mortem examination gives further information on these subjects and shows how the principal diseases may be distinguished.

The term cancer is sometimes applied to cases in which there are tumors on the liver.

MAGGOTS

Occasionally found in flesh wounds of poultry

Symptoms. A flesh wound that instead of healing develops into a sore with a slight running. On examination, maggots will be found.

Cause. Several species of flies are always ready to lay their eggs in any available wound or sore; therefore wounds must be watched in the case of poultry, as with all other animals of the farmyard. The eggs laid by these flies hatch and develop into small footless grubs commonly known as maggots.

Treatment. Wash the wound with 1 to 2% creolin; remove as many of the maggots as possible with a pair of tweezers or a

DISEASES AND PESTS OF FOWLS

feather. If the maggots are deep-seated, stuff the wound with a cotton wad saturated with strong creolin or 10% carbolic acid. Examine next day and remove dead maggots. Treat again in a similar manner if the maggots are not all killed. Fish oil, or iodoform made into a paste with vaseline, will prevent the flies depositing their eggs, if smeared on the surface of the wound.

MITES (AIR-SAC)

Not a common parasite

Symptoms. There are no definite external symptoms. If the bird is very badly affected, there may be evidences of suffocation. This may end fatally. A post-mortem examination will show the mites in the air passages and bronchi as small yellowish and whitish particles, which on careful observation may be seen to move.

Cause. A small mite (*Sarcoptes lævis*) which infests the air sacs and bronchi. These mites, when present in large numbers,

obstruct the air passages and cause suffocation. A secretion from the mucous mem-

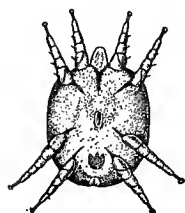


FIG. 15
THE AIR SAC MITE
(From Salmon.)

brane affected, results from the presence of the mites and increases the obstruction of the air passages.

Treatment. The fumigation method tried for gapes has been recommended, but there is little reason to expect success.

MITES, DEPLUMING (SCABIES)

Symptoms. Bare patches on the bird's body due to the loss of feathers. The rump and the breast are most frequently attacked.

Cause. A small mite (*Sarcoptes laevis*) found on the bird's body near the base of the fallen feathers.

Treatment. Isolate affected birds; rub bare patches and neighboring

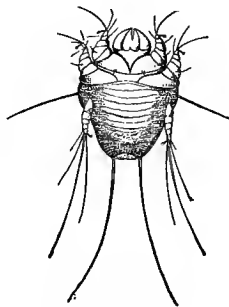


FIG. 16
THE DEPLUMING MITE
(From Salmon.)

DISEASES AND PESTS OF FOWLS

portion of body with sulphur ointment (see page 9) or dip body of fowl in a solution of about 2% creolin.

MITES (RED MITE)

A serious pest

Symptoms. Unthriftiness of birds.

Cause. A small whitish mite, which appears red when filled with blood. These mites suck the bird's blood at night and hide during the day in the sockets of the perches and in the crevices of the woodwork.

Treatment. Examine the fowl house at night. Dust hens with an insect powder; thoroughly spray houses and perches with 5% creolin or other disinfectant, and squirt kerosene oil or turpentine into cracks and crevices. A specially constructed mite-proof perch, or one that can be easily removed, should be used.

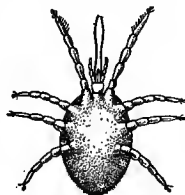


FIG. 17
THE RED MITE

MOLTING

Molting is not a disease, but may prove

trying to poultry not in the best condition to stand the strain of the process. Hens overtaxed with forced laying and cocks running with too large a number of hens are most likely to suffer. Molting occurs in healthy adult birds every twelve months. The process, which is a natural one, should be allowed to take its natural course unless the fowls appear weak and depressed during the period. In such cases specially nourishing and stimulating food should be given. Anyhow, it would be well to pay particular attention to the feeding of birds during the molting season.

OVARY DISEASES

Hens suffer from various diseases of the ovary, which may become shriveled and useless or gangrenous. Tumorous growths, sometimes called cancers, are also found. As diseased conditions of this organ can be detected only by post-mortem examination, and as no remedies are known, the subject need not be dealt with more fully.

DISEASES AND PESTS OF FOWLS

OVIDUCT, DISEASES OF

Abnormal eggs must be regarded as due to functional disorders of the oviduct. One cause of soft eggs is lack of shell-forming material; therefore a liberal supply of powdered oyster shells, or lime in some other form, should always be accessible to laying hens. Other abnormal eggs occur, such as those with double yolks, without any yolk, with blood clots, etc. No treatment can be suggested beyond feeding a varied diet and avoiding too stimulating or over-heating foods.

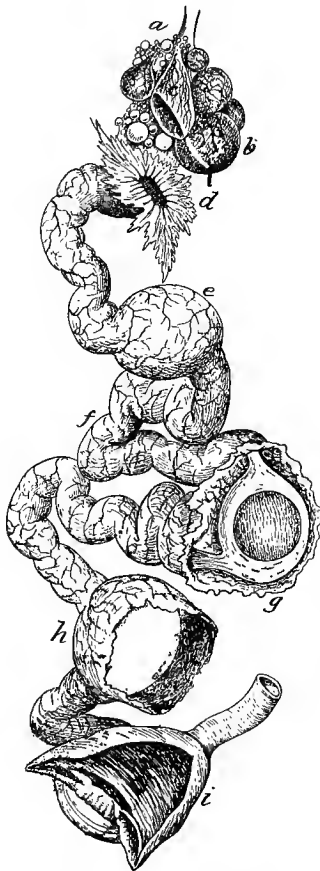
Prolapse of the oviduct may occur. The protruding portion should be oiled or vaselined and gently pressed back.

PERITONITIS

Not common and not contagious

Symptoms. Loss of appetite, fever and evidence of discomfort and pain in the stomach, especially if the abdomen is pressed with the hand. Post-mortem ex-

POULTRY DISEASES AND THEIR TREATMENT



- a. Undeveloped ovules in ovary.
- b. Partly developed ovule show-stigma. Here the follicle wall breaks and allows the ovule yolk to leave the ovary preparatory to laying.
- c. An empty follicle in which the stigma and the yolk passed out.
- d. Opening of oviduct.
- e. Portion of oviduct distended, allowing yolk to pass down.
- f. Walls of oviduct which secrete albumen forming the white of the egg.
- g. Membranous lining added.
- h. Portion of oviduct that secretes shell-forming substance.
- i. Cloaca.

FIG. 18.—ORGANS OF REPRODUCTION OF THE HEN

(From Salmon.)

DISEASES AND PESTS OF FOWLS

amination shows inflamed appearance of membrane of the abdominal cavity.

Cause. Serious inflammation of the wall of the abdominal cavity.

Treatment. Put the bird in a quiet place. Aconite (see page 9), to reduce the temperature, and opium, or one drop of laudanum, to relieve pain, have been recommended, but as a rule it is best to kill the bird.

PIP

Generally the effect of some other disorder

Symptoms. A hardened scale formed at tip of tongue.

Cause. Generally due to cold or other disorder affecting the breathing of the bird.

Treatment. Do not try to tear off the growth on the tongue by force, but moisten with vaseline or glycerin until it becomes loose. Give soft food.

PNEUMONIA AND CONGESTION OF LUNGS

Generally fatal

Symptoms. Extreme depression and

great difficulty in breathing. Difficult to distinguish in the living bird from a very bad cold. Post-mortem examination shows the affected lung filled with an exudate. The lung sinks if put in water.

Cause. Following on a cold, the lung becomes congested with blood and a dark, viscous matter. Pneumonia may be considered a further, and generally final, stage of congestion.

Treatment. A cure is seldom effected, but in the case of a valuable bird the following treatment may be tried: Keep the bird in a dry, warm place; paint the skin above the lungs with tincture of iodine; give aconite. Feed on soft food and give a stimulant.

POISONING

Symptoms. As a rule the poisons that fowls eat are mineral. The most pronounced symptom is evidence of pain. In cases of arsenical poison there is diarrhea. A poison containing a copper compound

acts partly as an emetic, causing the fowl to make an effort to vomit. In cases of mineral poisons, post-mortem examinations show inflammation of the stomach and the digestive tract.

Sources of poison. Poultry are likely to get poisoned from the following sources:

Fertilizers (e. g., nitrate of soda) used on fields in which fowls scratch for food. Such cases are rare.

Insecticides and fungicides (e. g., Paris green [arsenic], lead arsenate, Bordeaux mixture) applied to plants under which fowls run. If sprays are mixed in correct proportions and used in normal quantities, there is little danger to poultry feeding on the grass below sprayed trees. Great care should, however, be taken in disposing of the sediment and the residue after spraying operations are completed.

Rat poisons (e. g., phosphorus, strychnine, baryta). These poisons are particularly dangerous when mixed with cornmeal or other bait attractive to fowls. The best way to set rat poison is to put it in a piece

of piping of such a diameter and length that fowls cannot reach it.

Salt. Food mixed with salt for other domestic animals may be accidentally given to fowls. Chickens are the most likely to be poisoned by excess of salt.

Treatment. If fowls have eaten poisonous substances, the fact is not usually discovered until after death or until it is too late to administer an antidote. Most of the poisons fowls are likely to eat act as irritants of the digestive tract. Milk and white of egg should be given. It is advisable to give a stimulant, such as half a teaspoonful of brandy.

PYÆMIA

Not contagious, and not common

Symptoms. This disease cannot be diagnosed except by post-mortem examination and microscopic identification of pus-forming organisms in the infected areas (whitish spots) of liver, spleen, etc.

Cause. Pus-forming organisms believed

DISEASES AND PESTS OF FOWLS

to enter the blood through a wound in the skin.

Treatment. As there are no external symptoms, treatment is not possible.

RHEUMATISM

Not a common trouble

Symptoms. Lameness and stiffness of joints.

Cause. May be due in some cases to too stimulating food and to dampness.

Treatment. Put affected bird in dry quarters and vary food, adding more greens. Rub joints with embrocation, or turpentine and oil.

ROUP (CONTAGIOUS CATARRH)

One of the most serious contagious diseases

Symptoms. The bird first has symptoms of an ordinary cold, such as running at the nostrils and sneezing. Definite evidence of roup is the *offensive odor* detected on opening the bird's mouth. The exudate is also offensive. The disease may attack the eyes,

POULTRY DISEASES AND THEIR TREATMENT

which then become inflamed and swollen; a tumor, containing offensive, yellowish, cheesy matter, sometimes develops. The

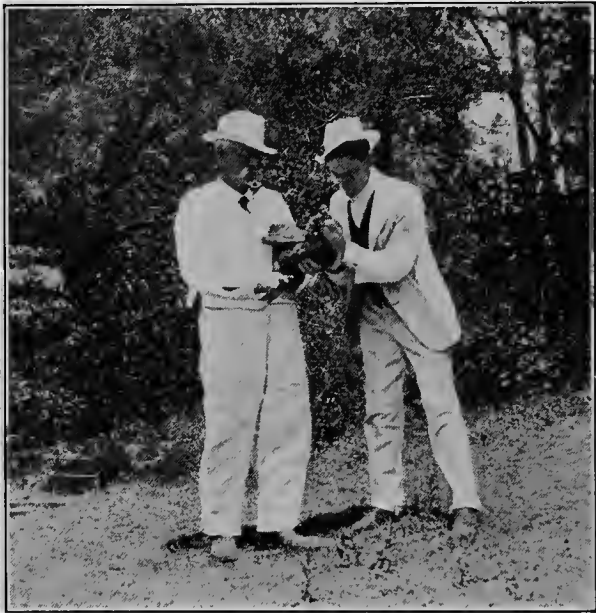


FIG. 19.—EXAMINING A FOWL WITH A SUSPICIOUS COLD

course of the disease may extend over several weeks or months and there may be cases of chronic roup. Some cases end fatally

in a comparatively short time. The form of the disease, in which yellowish patches develop on the throat, is dealt with under diphtheria or diphtheritic roup.

Cause. Cases of roup occur when birds are subjected to draft and damp, but the cause must be infection with disease germs. It is believed that the almost constant presence of the germs is due to lack of regular disinfection and to birds in the flock believed to have recovered from a previous attack of the disease, but that, in reality, are suffering from chronic roup, and are able, whenever suitable conditions arise for an outbreak of this disease, to infect the rest of the flock through the drinking water and the soil.

Treatment. The seriousness of this disease makes it imperative for the poultry rearer to isolate immediately any birds showing any suspicious symptoms. If treatment of the infected bird is taken in hand early, and carried out faithfully, a cure can be effected, but it is often wiser to kill and burn infected stock. In treating

birds, the mouth and nostrils should be washed out with 5% carbolic acid, or with 50% hydrogen peroxide, or with 2% permanganate of potash. It is important to clean out the passage of the nostrils, and this may be done by:

1. Pressing against the roof of the bird's mouth from inside and squeezing the nostrils from above downwards.
2. Syringing out the nostrils.
3. Dipping the fowl's head for a few seconds in a solution of the disinfectant. Great care should be exercised in this method of treatment, which is only recommended when permanganate of potash is used.

It is well to keep birds isolated for some time after apparent recovery. When the eye is affected (see Fig. 20), the tumor should be carefully lanced and the cheesy matter removed, after which the cavity should be rinsed out with one of the dis-

DISEASES AND PESTS OF FOWLS

infectants recommended above; such treatment may have to be repeated time after time.

As an after effect of a cold or of roup, conjunctivitis or sore eyes may develop. A discharge comes from the eyes and the eye-



FIG. 20.—A ROUPY EYE

lids become stuck together. Bathe the eyes with hydrogen peroxide mixed with an equal quantity of water.

If this condition follows an attack of roup, there is danger that the fowl has not entirely recovered, and may be a source of infection to the rest of the flock.

POULTRY DISEASES AND THEIR TREATMENT

SCALY LEG

An unsightly affection that, although contagious, does not spread rapidly

Symptoms. A rough and scaly growth on the legs of the bird.

Cause. A small mite (Fig. 22), known as *Sarcoptes mutans*, burrows in the skin

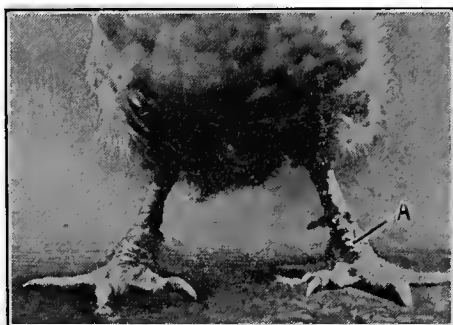


FIG. 21.—SCALY LEG
A. Showing early stages of attack.

and gives rise to the unsightly growth (Fig. 21) that gives this disease its name.

Treatment. Soften the scaly growth by washing and soaking the legs with warm water and soap. Scrub the affected portion

of the legs with a brush and then treat as follows: Dip the legs in kerosene oil, holding them there for not longer than a few seconds. If the kerosene oil is mixed with sweet oil, or if the legs are wet first with water, there will be no risk of the kerosene proving harsh, as sometimes happens. Sulphur ointment (see page 9) may be used instead of the kerosene oil treatment.

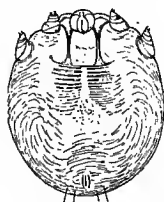


FIG. 22.—THE MITE THAT CAUSES SCALY LEG

SOFT CROP

Not a serious complaint

Symptoms. Distended crop, soft to the feel.

Cause. Over-eating; or food turning sour in the crop.

Treatment. Hold bird downwards and squeeze contents of crop through mouth, taking care not to suffocate the patient. Repeat treatment if necessary. Put on low diet for some time, feeding slowly and sparingly.

TICKS

A pest found in the Southern States and tropical countries

Symptoms. The fowl has fever, appears depressed, and stands in a cramped position.

Cause. The fowl tick (*Argas minatus*), which hides during the day in cracks and crevices, sucks the fowl's blood at night and introduces a fever-producing parasite.



FIG. 23
THE FOWL TICK
a. Adult.
b. Larva.

Remedies. Examine sick birds during the day, and visit the roosts at night, for proof of the presence of ticks; carefully search under perches, in nests, and in corners of woodwork, etc. Spray woodwork with 5% creolin; squirt kerosene oil, or turpentine, into cracks and crevices.

TUBERCULOSIS

A very serious poultry disease

Symptoms. This disease may be present in a poultry yard for some time without being detected. Suspicion should be

DISEASES AND PESTS OF FOWLS

aroused if birds gradually lose weight and die. If a bird that has gradually been getting thinner, goes lame, or loses the use of a wing, without apparent injury, the evidence that tuberculosis is present is strong, but positive proof of its presence can be obtained only by post-mortem and microscopic examination. This disease generally attacks adult birds.

Cause. The specific organism causing this disease, known as the *Bacillus tuberculosis* (Fig. 5), infects the liver (Fig. 24), the spleen (Fig. 24), and other organs, least fre-



FIG. 24.—ORGANS AFFECTED BY TUBERCULOSIS AND BLACKHEAD

- a. Normal spleen.
 - b. Tubercular spleen.
 - c. Portion of tubercular liver.
 - d. Blackhead liver of turkey for comparison with c.
- a and b after Edwards.

quently the lungs. The disease may be introduced into a flock by the purchase of an infected bird, and may be spread by uninfected birds picking up the excrement of diseased birds with their food.

Treatment. There is no known cure. The insidious manner in which this disease advances through a poultry yard makes it a very serious malady. Birds suffering from it should be killed and burnt. Thorough disinfection of coops, etc., should be made. Strict attention to sanitation will help in preventing and controlling this disease. If many birds in a flock are believed to have tuberculosis, it would be well to destroy the whole flock and start again, preferably on fresh ground.

WHITE DIARRHEA OF CHICKENS

A very serious disease, causing the death of large numbers

Symptoms. Chickens are generally attacked when 10 to 15 days old. They appear listless, their feathers become rough, and they stand about with drooping wings. A white diarrhea is soon noticed. Chicken

DISEASES AND PESTS OF FOWLS



FIG. 25.—CHICKENS AFFECTED WITH WHITE DIARRHEA
Ten-day White Leghorn chickens showing symptoms of hacillary white diarrhea. (After Rettger & Stoneburn.)

after chicken shows similar symptoms and dies, resulting in much loss and discouragement to the poultry rearer.

Cause. Various causes, such as improper or stale food, may upset the chicken's digestive organs and give rise to a whitish diarrhea, but the term "white diarrhea" is best restricted to a contagious form of diarrhea due to minute parasites in the intestinal tracts of chickens. A coccidium

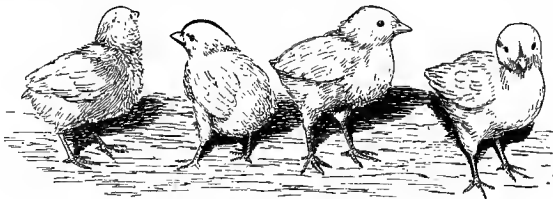


FIG. 26.—HEALTHY CHICKENS
Normal ten-day White Leghorn chickens. (After Rettger & Stoneburn.)

POULTRY DISEASES AND THEIR TREATMENT

and a bacillus have been proved by different investigators to cause very similar forms of white diarrhea. A distinct form of white diarrhea, known as brooder pneumonia, is described on page 35.

Treatment. This disease is a very difficult one to control. Incubators and brooders should be thoroughly disinfected. Special care should be taken in the feeding during the first few weeks. Chickens should not be overfed. The feeding of dry bran is recommended, as it tends to keep the bowels in a healthy, active condition. In the form of white diarrhea due to a bacillus, suspicion rests on the hen and the egg as sources of infection. When the disease becomes serious, and general sanitation and proper care of chickens do not control it, the advisability of obtaining the eggs for hatching from a poultry farm free of white diarrhea should be considered.

WORMS

Intestinal parasites that occasionally become serious

Symptoms. General debility; worms or

DISEASES AND PESTS OF FOWLS

segments of worms, seen in the droppings. If there is doubt as to whether a flock is suffering from worms, give a suspected bird a strong purgative and keep it up so that the feces may be examined for worms.

If doubt still exists, the suspected bird should be killed and a post-mortem examination made. Cut the intestines open lengthways (see Fig. 34) with a small pair of scissors

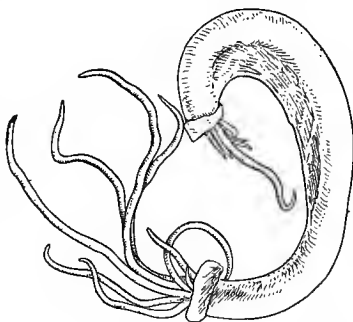


FIG. 27.—WORMS IN INTESTINAL TRACT OF FOWL

(After Bradshaw. From Pearl, Surface & Curtis.)

and wash them out with water so as to detect the smaller worms, and the tapeworms attached to the lining of the intestines.

Cause. Two classes of worms are commonly parasitic on fowls—round worms (see Fig. 27) and tapeworms. There are generally a few specimens of worms in the intestines of fowls; but only when the num-

POULTRY DISEASES AND THEIR TREATMENT

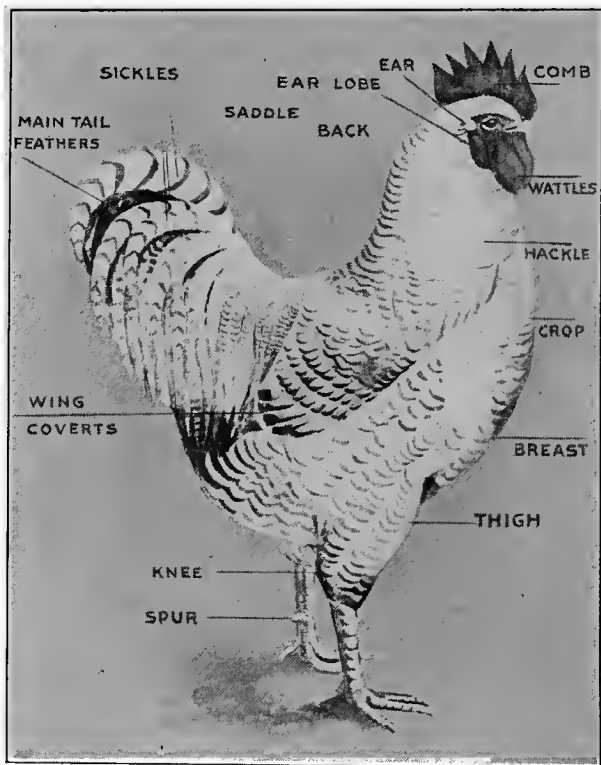


FIG. 28.—THE PARTS OF A FOWL

DISEASES AND PESTS OF FOWLS

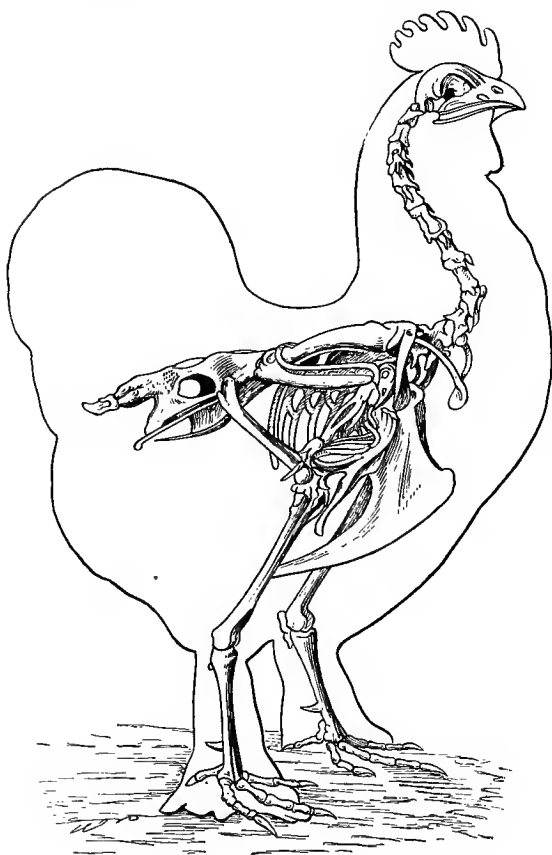


FIG. 29.—SKELETON OF A FOWL

bers are large do worms affect the health of the fowl.

Treatment. Every bird suspected of having worms may be tested with a purgative as suggested above. Or, if it is established that several birds in a flock are suffering from worms, all in poor condition, without any cause being apparent, should be dosed with santonin—three to five grains in the morning before any food has been picked up. After about two hours give a purgative of two teaspoonfuls of castor oil and soon after let the fowl have its morning food. As important as dosing the fowls, is disinfecting the feed troughs, the water vessels, and the soil of the runs in order to prevent re-infection.

Nodular tæniasis. Small nodules on the intestines, resembling the nodules in tuberculosis, are sometimes caused by tapeworms. The name “nodular tæniasis” has been given to this disease.

CHAPTER V

POST-MORTEM EXAMINATIONS

1. Making the Examination

A POST-MORTEM examination should always be undertaken if there is any doubt as to the cause of death. Poultry rearers who are not already familiar with the normal appearance of the internal organs of a fowl should take the first opportunity of studying them.

Post-mortem examinations should be done in a systematic manner; but, if desired, a very speedy examination may be made by rapidly removing, or bending back, the breast bone of the unplucked bird.

It will be more generally satisfactory, however, to devote time to the operation, and it is suggested that the work be carried out on the following lines:

1. Nail the body of the dead fowl on a board in the position shown

POULTRY DISEASES AND THEIR TREATMENT

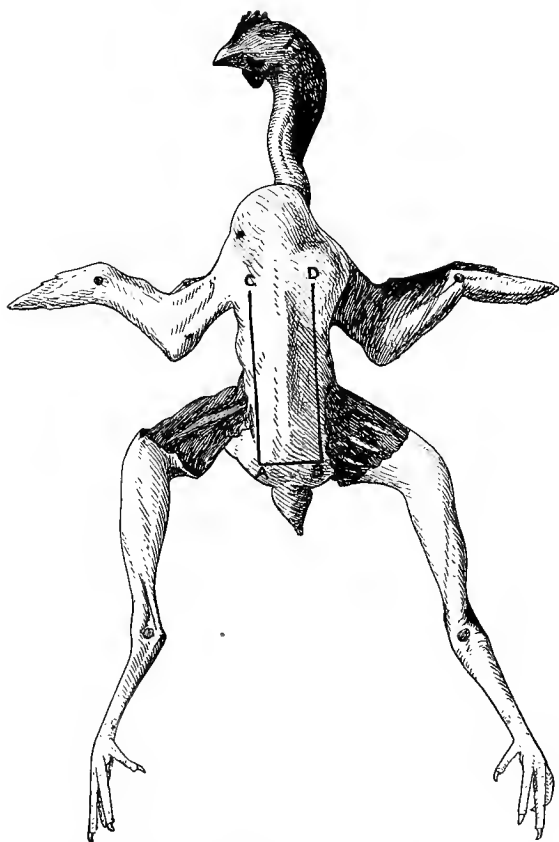


FIG. 30.—POST-MORTEM EXAMINATION NO. 1
Fowl nailed on board; lines A B, A C and B D show where to cut.

POST-MORTEM EXAMINATIONS

in Fig. 30, having first partly or wholly plucked the bird.

2. With a sharp knife cut along lines AC, BD (Fig. 30), and bend the breast bone backwards, exposing the internal organs. (Fig. 31.) As the breast bone is raised it will be necessary to cut through the mesentery and other connecting tissues. Break it back at D, cutting through the flesh and the muscle with sharp scissors.
3. Remove heart, liver, gall-bladder and spleen, making neat severances and without injury to any of the other organs. If the heart or large blood vessels be injured in the operation, blood will flow out and interfere with the work.
4. Cut through the œsophagus, below or above the crop, as most convenient, and also cut through the large intestine near

POULTRY DISEASES AND THEIR TREATMENT

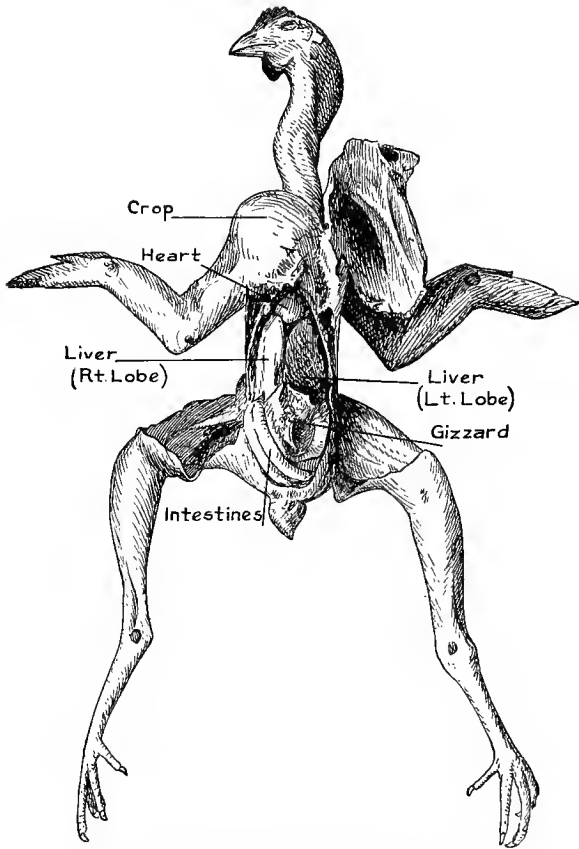


FIG. 31.—POST-MORTEM EXAMINATION NO. 2
Breast bone removed; internal organs in situ.

POST-MORTEM EXAMINATIONS

the cloaca. Without disconnecting the parts, lift out the gizzard, intestines, and other portions of the alimentary canal, carefully tearing away the membranous tissues of the mesentery.

5. Spread the organs out and examine each one carefully and critically, making sections if necessary. (Fig. 32.)
6. Cut open gullet, crop, stomach, gizzard, intestines, and cæca and examine the contents.
7. Examine the lungs, cutting off a portion and throwing it into water, when it will float if healthy, but sink if congested.
8. Cut through the skin of the neck. Sever the windpipe near the head, and also where the bronchi enter the lungs. With scissors cut it open, and examine for molds or gapes or for exudates indicative of various

POULTRY DISEASES AND THEIR TREATMENT

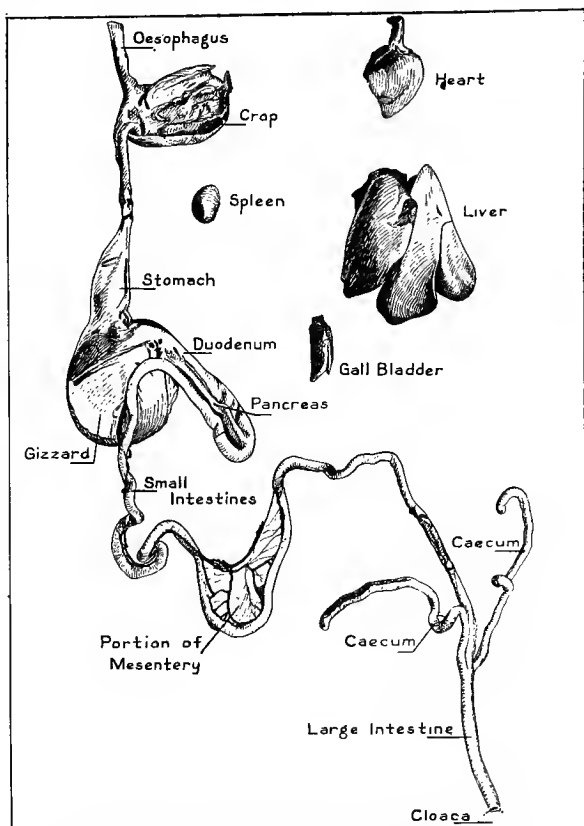


FIG. 32.—POST-MORTEM EXAMINATION NO. 3
Internal organs removed for examination.

forms of cold or lung congestion.

9. Examine the brain (Fig. 34) for blood clots. Some care will be necessary in cutting through the skull so as not to injure the brain tissue, which should be a milky white. A sharp and strong pair of scissors or a small, fine saw (e. g., tenon saw) will be useful for older birds. Remove the skin and cut from behind, raising the bones and exposing the brain.

2. *The Normal Condition of the Internal Organs*

(See Fig. 32.)

The *œsophagus* carries the food from the mouth and passing down the neck beside the windpipe opens into—

The *crop*, where the food is macerated. Thence it gradually passes into—

The *true stomach* (or proventriculus),

POULTRY DISEASES AND THEIR TREATMENT

which is lined with small gastric-secreting glands that may be seen with the naked eye. This organ is hidden by the liver, and opens directly into—

The *gizzard*, situated on the left side of the abdomen. It rests on the coiled-up mass

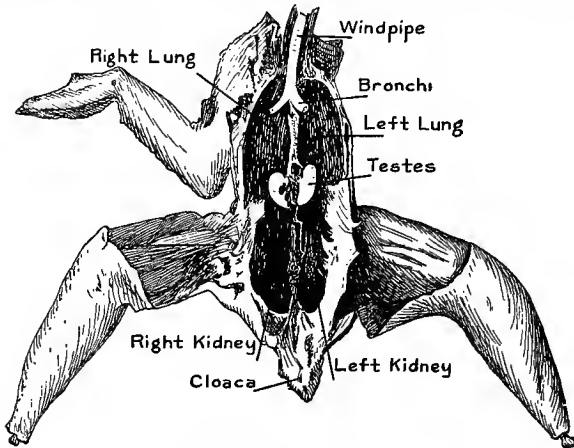


FIG. 33.—POST-MORTEM EXAMINATION NO. 4
Lungs, kidneys, etc., in situ.

of intestines. It is dark red and is partly hidden by the left lobe of the liver. The walls are strong and muscular. Here the food is ground against small bits of stone, etc. The partially digested food passes out

POST-MORTEM EXAMINATIONS

through an aperture near the entrance of the true stomach into—

The *duodenum* or upper portion of the small intestine. It forms a loop that incloses—

The *pancreas*, a compact, flattened organ, pinkish in color, that discharges its secretion by three ducts into the intestines.

The *small intestine*, after forming the loop (duodenum), continues its course. It first passes toward the left and is disposed in many folds connected by the mesentery; toward the end it passes up behind the true stomach. Connected to the intestines are the blind bodies known as—

The *cæca*, connected to the small intestines for several inches and which, after becoming considerably smaller in diameter, enter the alimentary tract where—

The *large intestine* (rectum) starts. This portion of the intestines is short and enters—

The *cloaca*, into which the urinary and reproductive ducts discharge. The external opening is known as the *vent* or *anus*.

The *brain*, situated in the back of the

head, is protected by the cranial bones. It is milky white except where the blood vessels may be seen.

The *windpipe* connects the larynx at the throat with the lungs branching into the two *bronchi*.

The *lungs*, situated in the upper portion of the thoracic abdominal cavity, are firmly attached to the ribs, in the interspaces between which they fit. They are flattened and oval in shape, bright red in color, and loose and spongy in texture.

The *heart* is cone-shaped. The lower portion rests between the lobes of the liver. The heart is red and is inclosed in a sac (the pericardium) that is easily removed.

The *liver*, situated a little lower down than the heart, consists of two lobes. The right lobe is often larger than the left which may be cleft at the lower end. The left lobe covers the true stomach and part of the gizzard. If there is some delay in holding a post-mortem examination the edges of the lobes of the liver become discolored. Normally the color is a purplish red.

POST-MORTEM EXAMINATIONS

The *gall bladder* fits into a shallow depression on the underside of the right lobe of the liver and appears green in color. A duct conveys the bile from the liver into the gall bladder, whence it passes by another duct into the intestine.

The *spleen*, a nearly round, reddish body, with a purplish tinge, is attached by a ligament to the right side of the true stomach and is hidden by the liver.

The *kidneys* extend along the sides of the spine from immediately below the lungs to near the termination of the abdominal cavity. The general color is a chocolate red, but a small portion at the upper end (known as the adrenal), is yellow. There is no urinary bladder. The urates are carried direct through the *ureters* to the cloaca.

The *testes* (of the male bird) are attached to the upper portion of the kidneys. They are white or very light-colored, and may be of different sizes.

The *ovary* (of the female bird), situated on the left side, covers the kidney on that side. It consists of numerous ova of vari-

POULTRY DISEASES AND THEIR TREATMENT

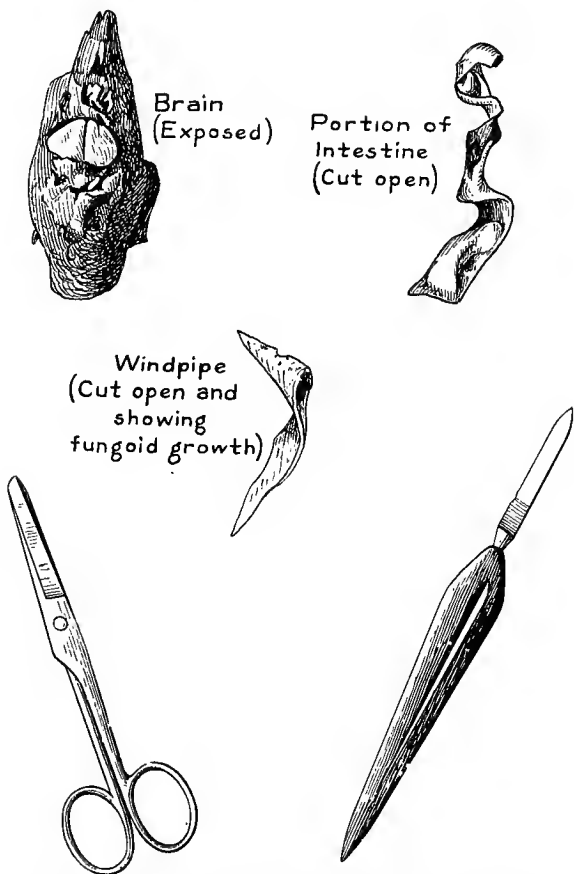


FIG. 34.—POST-MORTEM EXAMINATION NO. 5
Examination of brain and of portions of intestines and windpipe.

ous sizes each of which may develop into an egg. As an ovum passes through the oviduct it is first coated with an albuminous covering (the white of egg); lower down it is coated with a calcareous deposit that forms the shell of the egg. (Fig. 18.)

3. *Diagnosis of Disease by Post-Mortem Symptoms*

For purposes of diagnosis each organ must be examined. Note in each case if it is enlarged, spotted, ruptured, inflamed or engorged with blood. Observe if it is an unusual color or if it possesses any other symptom of an abnormal character.

A single symptom in a single organ, unless very pronounced and characteristic, will not be sufficient evidence for forming an accurate opinion as to the cause of death. But if the condition of the other organs and the symptoms before and attending death are taken into consideration, there will seldom be any difficulty, from a practical standpoint, in deciding upon the nature of

the disease. Many points can be decided only by a pathologist with the aid of a microscope, such, for example, as the difference between coccidial and bacterial diarrhea, but it is quite enough for the poultryman to realize that one of his fowls has died of an attack of an acute form of diarrhea and that the rest of his birds may become infected.

The following notes draw attention to the main diagnostic symptoms observable on post-mortem examination, arranged under the heading of the organs affected. Other symptoms are put in parentheses.

POST-MORTEM SYMPTOMS

BRAIN

Apoplexy.—Shown by congestion of blood vessels of brain. (Staggering gait and sudden death.)

HEART

Cholera.—Punctiform hemorrhages are generally found in the heart in cases of cholera. (Yellow feces; diarrhea; sudden

POST-MORTEM EXAMINATIONS

death of several or many fowls; inflammation of upper portion of intestines.)

LIVER

Tuberculosis.—Yellowish-white spots on liver varying in size, somewhat *raised* and convex; the spots or nodules may be readily separated from the rest of the liver. The liver itself is often very much enlarged. (Fowl gradually loses weight and may go lame; mesentery and spleen affected with nodules.)

Cholera.—Liver enlarged, dark green and softened, sometimes showing whitish spots.

Coccidial diarrhea.—More or less circular patches, depressed in the centre, associated with plugged cæca, the linings of which have sores.

Congested liver.—Much enlarged and engorged with blood, may be readily torn.

Fatty degeneration or fatty liver.—In the first case the liver is rather shrunken and

hardened, and in the latter excessive deposits of fat may be noticed.

Liver trouble.—(Indigestion.) An enlarged liver without any of the special symptoms noted among the other diseases of the liver.

Gout.—Needle-like crystals (urate of soda) give the liver the appearance of having been covered with chalk. (Other organs in abdominal cavity covered with same powder-like crystals.)

Aspergillosis.—Necrotic areas with mold. (Fowls go light and move about in a depressed manner, resting on their breast bones.)

STOMACH

Gastritis.—The mucous membrane lining of the stomach is reddened and inflamed.

INTESTINES

Diarrhea.—Acute forms of intestinal troubles give rise to inflammation of the

POST-MORTEM EXAMINATIONS

mucous membrane lining the walls of the intestines.

Cholera.—The upper portion of the intestines may be reddened and the contents show streaks or clots of blood.

Worms.—Round or tape worms present in intestines.

CÆCA

These blind ducts are of importance in showing the presence of coccidiosis in fowls or blackhead in turkeys.

Coccidial diarrhea.—The cæca are enlarged and show ulcers developing from the inside.

WINDPIPE

The linings of this organ should be clean and free of obstruction or mucous exudations.

Gapes.—Small worms about three-quarters of an inch long are found attached to the trachea.

Aspergillois.—A whitish mold will be seen along the inside of the windpipe.

Pneumonia.—The bronchial tubes contain a thick mucous exudate.

Congestion of lungs.—Blood escaped from congested lungs is found in the bronchi.

LUNGS

These should be a bright red and spongy in texture.

Congestion.—One or both lungs are distended with blood and dark in color.

Pneumonia.—A condition that follows on congestion, the whole lung affected losing its spongy texture, the air spaces being filled with a semi-solid substance.

Brooder pneumonia.—Spots due to an aspergillus fungus on lungs. (Chickens attacked.)

MESENTERY

Cholera.—Congestion of blood vessels of mesentery often seen.

POST-MORTEM EXAMINATIONS

Tuberculosis.—The mesentery may be studded with nodules.

SPLEEN

Tuberculosis.—A greatly enlarged spleen.

Enteritis.—(Bacterial.) Spleen enlarged but paler in color.

URETERS

Cholera.—Ureters distended with yellow urates.

INDEX

	PAGE
Abscesses	26
Abnormal eggs (see Oviduct diseases)	77
Aconite	9
Air under skin (see Emphysema)	54
Air sac mite (see Mites, air sac)	73
Anæmia	27
Apoplexy	28
Aspergillosis	29
Atrophy of liver (see Liver diseases)	70
Bacterial enteritis (see Diarrhea)	48
Baldness (see Favus)	56
Biliary repletion (see Jaundice)	65
Blackhead of turkeys	30
Brandy	9
Breakdown	33
Broken limbs (see Fractures)	58
Bronchitis	34
Brooder pneumonia	35
Bumblefoot	36
Calomel	9
Cancer (see Liver diseases and Ovary diseases)	72, 76
Canker (see Diphtheria)	49
Carbolic acid	9
Castor oil	9
Catarrh (see Cold)	43
Catarrh, contagious (see Roup)	83
Catarrh of crop	37
Catarrh of stomach (see Gastritis)	62
Chicken pox	38

INDEX

	PAGE
Chlorodyne	9
Cholera	39
Cloacitis	41
Coccidiosis of adult fowls	42
Coccidiosis of chickens (see Brooder pneumonia)	35
Coccidiosis of turkeys (see Blackhead)	30
Cold	43
Congestion of the liver (see Liver diseases)	70
Congestion of the Lungs (see Pneumonia)	79
Conjunctivitis (see Roup)	83
Constipation	44
Cramp	45
Creolin	9
Crop-bound	46
Crop, soft	89
Crop, catarrh of	37
Depluming mite	74
Diarrhea, bacterial	48
Diarrhea, mycotic	48
Diarrhea, protozoan	48
Diarrhea, mild	47
Diarrhea, severe	48
Diarrhea, white	47
Diphtheria	49
Diphtheritic roup	49
Disinfection	10
Dislocations (see Fractures)	58
Doses	9
Dropsy	52
Drugs	9
Ducks	20
Dysentery	52
Egg-bound	53
Egg-eating	54

INDEX

	PAGE
Emphysema	54
Enlargement of heart (see Heart, diseases of)	64
Enlargement of liver (see Liver diseases)	70
Enlargement of kidneys (see Kidney diseases)	66
Enteritis (see Diarrhea)	46
Entero-hepatitis (see Blackhead)	30
Epilepsy	55
Epsom salts	9
Fatty degeneration	56
Favus	56
Feather-eating	57
Fits (see Epilepsy)	55
Fleas	58
Fowl typhoid	41
Fractures	58
Frost bite	59
Gangrenous ovary (see Ovary diseases)	76
Gapes	60
Gastritis	62
Geese	21
Going light (see Anæmia)	27
Gout	63
Grippe (see Cold)	43
Guinea fowls	21
Heart, diseases of	63
Heart, dropsy of	64
Heart, enlargement of	64
Heart, rupture	64
Hydrogen peroxide	9
Hypertrophy of the liver (see Liver diseases)	70
Impaction of crop (see Crop-bound)	46
Indigestion	64
Influenza (see Cold)	43,
Iodine	9.

INDEX

	PAGE
Jaundice	65
Kidney diseases	65
Leg weakness	66
Leukemia (see Cholera)	39
Lice	66
Limber-neck	69
Liver diseases	70
Lungs, congestion of (see Pneumonia)	79
Maggots	72
Medicines	9
Mites, air sac	73
Mites, depluming	74
Mites, red	75
Mites, scaly leg (see Scaly leg)	88
Molting	75
Nodular tæniasis (see Worms)	97
Nursing fowls	5
Ointment	9
Ovary diseases	76
Oviduct diseases	77
Peritonitis	77
Permanganate of potash	9
Pigeons	21
Pip	79
Pneumonia	79
Poisoning	80
Post-mortem examination	99
Prolapse of oviduct (see Oviduct diseases)	77
Puffed skin (see Emphysema)	54
Pyæmia	82
Quinine	9
Rheumatism	83
Roup	83
Scabies (see Mites, depluming)	74
Scaly leg	88

INDEX

	PAGE
Soft crop	89
Sore head (see Chicken pox)	38
Sulphur ointment	9
Ticks	90
Tuberculosis	90
Turkeys	20
Turpentine	9
Vertigo (see Apoplexy)	28
Water	11
White comb (see Favus)	56
White diarrhea of chickens	92
Worms	94

STANDARD BOOKS

PUBLISHED BY

ORANGE JUDD COMPANY

NEW YORK

ASHLAND BUILDING
315-321 Fourth Avenue

CHICAGO

PEOPLE'S GAS BUILDING
150 Michigan Avenue

Any of these books will be sent by mail, postpaid, to any part of the world, on receipt of catalog price. We are always happy to correspond with our patrons, and cordially invite them to address us on any matter pertaining to rural books. Send for our large illustrated catalog, free on application.

First Principles of Soil Fertility

By ALFRED VIVIAN. There is no subject of more vital importance to the farmer than that of the best method of maintaining the fertility of the soil. The very evident decrease in the fertility of those soils which have been under cultivation for a number of years, combined with the increased competition and the advanced price of labor, have convinced the intelligent farmer that the agriculture of the future must be based upon more rational practices than those which have been followed in the past. We have felt for some time that there was a place for a brief, and at the same time comprehensive, treatise on this important subject of Soil Fertility. Professor Vivian's experience as a teacher in the short winter courses has admirably fitted him to present this matter in a popular style. In this little book he has given the gist of the subject in plain language, practically devoid of technical and scientific terms. It is pre-eminently a "First Book," and will be found especially valuable to those who desire an introduction to the subject, and who intend to do subsequent reading. Illustrated. 5x7 inches. 265 pages. Cloth. Net, \$1.00

The Study of Corn

By PROF. V. M. SHOESMITH. A most helpful book to all farmers and students interested in the selection and improvement of corn. It is profusely illustrated from photographs, all of which carry their own story and contribute their part in making pictures and text matter a clear, concise and interesting study of corn. Illustrated. 5x7 inches. 100 pages. Cloth Net, \$0.50

The New Egg Farm

By H. H. STODDARD. A practical, reliable manual on producing eggs and poultry for market as a profitable business enterprise, either by itself or connected with other branches of agriculture. It tells all about how to feed and manage, how to breed and select, incubators and brooders, its labor-saving devices, etc., etc. Illustrated. 331 pages. 5 x 7 inches. Cloth. \$1.00

Poultry Feeding and Fattening

Compiled by G. B. FISKE. A handbook for poultry keepers on the standard and improved methods of feeding and marketing all kinds of poultry. The subject of feeding and fattening poultry is prepared largely from the side of the best practice and experience here and abroad, although the underlying science of feeding is explained as fully as needful. The subject covers all branches, including chickens, broilers, capons, turkeys and waterfowl; how to feed under various conditions and for different purposes. The whole subject of capons and caponizing is treated in detail. A great mass of practical information and experience not readily obtainable elsewhere is given with full and explicit directions for fattening and preparing for market. This book will meet the needs of amateurs as well as commercial poultry raisers. Profusely illustrated. 160 pages. 5 x 7½ inches. Cloth. . . . \$0.50

Poultry Architecture

Compiled by G. B. FISKE. A treatise on poultry buildings of all grades, styles and classes, and their proper location, coops, additions and special construction; all practical in design, and reasonable in cost. Over 100 illustrations. 125 pages. 5 x 7 inches. Cloth. \$0.50

Poultry Appliances and Handicraft

Compiled by G. B. FISKE. Illustrated description of a great variety and styles of the best homemade nests, roosts, windows, ventilators, incubators and brooders, feeding and watering appliances, etc., etc. Over 100 illustrations. Over 125 pages. 5 x 7 inches. Cloth. \$0.50

Turkeys and How to Grow Them

Edited by HERBERT MYRICK. A treatise on the natural history and origin of the name of turkeys; the various breeds, the best methods to insure success in the business of turkey growing. With essays from practical turkey growers in different parts of the United States and Canada. Copiously illustrated. 154 pages. 5 x 7 inches. Cloth. . . . \$1.00

Profitable Stock Raising

By CLARENCE A. SHAMEL. This book covers fully the principles of breeding and feeding for both fat stock and dairying type. It tells of sheep and mutton raising, hot house lambs, the swine industry and the horse market. Finally, he tells of the preparation of stock for the market and how to prepare it so that it will bring a high market price. Live stock is the most important feature of farm life, and statistics show a production far short of the actual requirements. There are many problems to be faced in the profitable production of stock, and these are fully and comprehensively covered in Mr. Shamel's new book. Illustrated. 5x7 inches. 288 pages. Cloth. Net, \$1.50

The Business of Dairying

By C. B. LANE. The author of this practical little book is to be congratulated on the successful manner in which he has treated so important a subject. It has been prepared for the use of dairy students, producers and handlers of milk, and all who make dairying a business. Its purpose is to present in a clear and concise manner various business methods and systems which will help the dairyman to reap greater profits. This book meets the needs of the average dairy farmer, and if carefully followed will lead to successful dairying. It may also be used as an elementary textbook for colleges, and especially in short-course classes. Illustrated. 5x7 inches. 300 pages. Cloth. Net, \$1.25

Questions and Answers on Buttermaking

By CHAS. A. PUBLAW. This book is entirely different from the usual type of dairy books, and is undoubtedly in a class by itself. The entire subject of butter-making in all its branches has been most thoroughly treated, and many new and important features have been added. The tests for moisture, salt and acid have received special attention, as have also the questions on cream separation, pasteurization, commercial starters, cream ripening, cream overrun, marketing of butter, and creamery management. Illustrated. 5x7 inches. 100 pages. Cloth. Net, \$0.50

Questions and Answers on Milk and Milk Testing

By CHAS. A. PUBLAW, and HUGH C. TROY. A book that no student in the dairy industry can afford to be without. No other treatise of its kind is available, and no book of its size gives so much practical and useful information in the study of milk and milk products. Illustrated. 5x7 inches. 100 pages. Cloth. Net, \$0.50

Soils

By CHARLES WILLIAM BURKEIT, Director Kansas Agricultural Experiment Station. The most complete and popular work of the kind ever published. As a rule, a book of this sort is dry and uninteresting, but in this case it reads like a novel. The author has put into it his individuality. The story of the properties of the soils, their improvement and management, as well as a discussion of the problems of crop growing and crop feeding, make this book equally valuable to the farmer, student and teacher. Illustrated. 303 pages. 5½x8 inches. Cloth. . Net, \$1.25

Weeds of the Farm Garden

By L. H. PAMMEL. The enormous losses, amounting to several hundred million dollars annually in the United States, caused by weeds stimulate us to adopt a better system of agriculture. The weed question is, therefore a most important and vital one for American farmers. This treatise will enable the farmer to treat his field to remove weeds. The book is profusely illustrated by photographs and drawings made expressly for this work, and will prove invaluable to every farmer, land owner, gardener and park superintendent. 5x7 inches. 300 pages. Cloth. Net, \$1.50

Farm Machinery and Farm Motors

By J. B. DAVIDSON and L. W. CHASE. Farm Machinery and Farm Motors is the first American book published on the subject of Farm Machinery since that written by J. J. Thomas in 1867. This was before the development of many of the more important farm machines, and the general application of power to the work of the farm. Modern farm machinery is indispensable in present-day farming operations, and a practical book like Farm Machinery and Farm Motors will fill a much-felt need. The book has been written from lectures used by the authors before their classes for several years, and which were prepared from practical experience and a thorough review of the literature pertaining to the subject. Although written primarily as a text-book, it is equally useful for the practical farmer. Profusely illustrated. 5½x8 inches. 520 pages. Cloth. Net, \$2.00

The Book of Wheat

By P. T. DONDLINGER. This book comprises a complete study of everything pertaining to wheat. It is the work of a student of economic as well as agricultural conditions, well fitted by the broad experience in both practical and theoretical lines to tell the whole story in a condensed form. It is designed for the farmer, the teacher, and the student as well. Illustrated. 5½x8 inches. 370 pages. Cloth. Net, \$2.00

Bean Culture

By GLENN C. SEVEY, B.S. A practical treatise on the production and marketing of beans. It includes the manner of growth, soils and fertilizers adapted, best varieties, seed selection and breeding, planting, harvesting, insects and fungous pests, composition and feeding value; with a special chapter on markets by Albert W. Fulton. A practical book for the grower and student alike. Illustrated. 144 pages. 5 x 7 inches. Cloth. \$0.50

Celery Culture

By W. R. BEATTIE. A practical guide for beginners and a standard reference of great interest to persons already engaged in celery growing. It contains many illustrations giving a clear conception of the practical side of celery culture. The work is complete in every detail, from sowing a few seeds in a window-box in the house for early plants, to the handling and marketing of celery in carload lots. Fully illustrated. 150 pages. 5 x 7 inches. Cloth. \$0.50

Tomato Culture

By WILL W. TRACY. The author has rounded up in this book the most complete account of tomato culture in all its phases that has ever gotten together. It is no second-hand work of reference, but a complete story of the practical experiences of the best-posted expert on tomatoes in the world. No gardener or farmer can afford to be without the book. Whether grown for home use or commercial purposes, the reader has here suggestions and information nowhere else available. Illustrated. 150 pages. 5 x 7 inches. Cloth. \$0.50

The Potato

By SAMUEL FRASER. This book is destined to rank as a standard work upon Potato Culture. While the practical side has been emphasized, the scientific part has not been neglected, and the information given is of value, both to the grower and to the student. Taken all in all, it is the most complete, reliable and authoritative book on the potato ever published in America. Illustrated. 200 pages. 5 x 7 inches. Cloth. . . \$0.75

Dwarf Fruit Trees

By F. A. WAUGH. This interesting book describes in detail the several varieties of dwarf fruit trees, their propagation, planting, pruning, care and general management. Where there is a limited amount of ground to be devoted to orchard purposes, and where quick results are desired, this book will meet with a warm welcome. Illustrated. 112 pages. 5 x 7 inches. Cloth. \$0.50

Cabbage, Cauliflower and Allied Vegetables

By C. L. ALLEN. A practical treatise on the various types and varieties of cabbage, cauliflower, broccoli, Brussels sprouts, kale, collards and kohlrabi. An explanation is given of the requirements, conditions, cultivation and general management pertaining to the entire cabbage group. After this each class is treated separately and in detail. The chapter on seed raising is probably the most authoritative treatise on this subject ever published. Insects and fungi attacking this class of vegetables are given due attention. Illustrated, 126 pages. 5 x 7 inches. Cloth. \$0.50

Asparagus

By F. M. HEXAMER. This is the first book published in America which is exclusively devoted to the raising of asparagus for home use as well as for market. It is a practical and reliable treatise on the saving of the seed, raising of the plants, selection and preparation of the soil, planting, cultivation, manuring, cutting, bunching, packing, marketing, canning and drying, insect enemies, fungous diseases and every requirement to successful asparagus culture, special emphasis being given to the importance of asparagus as a farm and money crop. Illustrated. 174 pages. 5 x 7 inches. Cloth. . \$0.50

The New Onion Culture

By T. GRIFINER. Rewritten, greatly enlarged and brought up to date. A new method of growing onions of largest size and yield, on less land, than can be raised by the old plan. Thousands of farmers and gardeners and many experiment stations have given it practical trials which have proved a success. A complete guide in growing onions with the greatest profit, explaining the whys and wherefores. Illustrated 5 x 7 inches. 140 pages. Cloth. \$0.50

The New Rhubarb Culture

A complete guide to dark forcing and field culture. Part I—By J. E. MORSE, the well-known Michigan trucker and originator of the now famous and extremely profitable new methods of dark forcing and field culture. Part II—Compiled by G. B. FISKE. Other methods practiced by the most experienced market gardeners, greenhouse men and experimenters in all parts of America. Illustrated. 130 pages. 5 x 7 inches. Cloth \$0.50

Alfalfa

By F. D. COBURN. Its growth, uses, and feeding value. The fact that alfalfa thrives in almost any soil; that without reseeded, it goes on yielding two, three, four, and sometimes five cuttings annually for five, ten, or perhaps 100 years; and that either green or cured it is one of the most nutritious forage plants known, makes reliable information upon its production and uses of unusual interest. Such information is given in this volume for every part of America, by the highest authority. Illustrated. 164 pages. 5 x 7 inches. Cloth. \$0.50

Ginseng, Its Cultivation, Harvesting, Marketing and Market Value

By MAURICE G. KAINS, with a short account of its history and botany. It discusses in a practical way how to begin with either seeds or roots, soil, climate and location, preparation planting and maintenance of the beds, artificial propagation, manures, enemies, selection for market and for improvement, preparation for sale, and the profits that may be expected. This booklet is concisely written, well and profusely illustrated, and should be in the hands of all who expect to grow this drug to supply the export trade, and to add a new and profitable industry to their farms and gardens, without interfering with the regular work. New edition. Revised and enlarged. Illustrated. 5 x 7 inches. Cloth. . . . \$0.50

Landscape Gardening

By F. A. WAUGH, professor of horticulture, university of Vermont. A treatise on the general principles governing outdoor art; with sundry suggestions for their application in the commoner problems of gardening. Every paragraph is short, terse and to the point, giving perfect clearness to the discussions at all points. In spite of the natural difficulty of presenting abstract principles the whole matter is made entirely plain even to the inexperienced reader. Illustrated. 152 pages. 5 x 7 inches. Cloth. . . . \$0.50

Hedges, Windbreaks, Shelters and Live Fences

By E. P. POWELL. A treatise on the planting, growth and management of hedge plants for country and suburban homes. It gives accurate directions concerning hedges; how to plant and how to treat them; and especially concerning windbreaks and shelters. It includes the whole art of making a delightful home, giving directions for nooks and balconies, for bird culture and for human comfort. Illustrated. 140 pages. 5 x 7 inches. Cloth. . . . \$0.50

Successful Fruit Culture

By SAMUEL T. MAYNARD. A practical guide to the cultivation and propagation of Fruits, written from the standpoint of the practical fruit grower who is striving to make his business profitable by growing the best fruit possible and at the least cost. It is up-to-date in every particular, and covers the entire practice of fruit culture, harvesting, storing, marketing, forcing, best varieties, etc., etc. It deals with principles first and with the practice afterwards, as the foundation, principles of plant growth and nourishment must always remain the same, while practice will vary according to the fruit grower's immediate conditions and environments. Illustrated. 265 pages. 5 x 7 inches. Cloth. \$1.00

Plums and Plum Culture

By F. A. WAUGH. A complete manual for fruit growers, nurserymen, farmers and gardeners, on all known varieties of plums and their successful management. This book marks an epoch in the horticultural literature of America. It is a complete monograph of the plums cultivated in and indigenous to North America. It will be found indispensable to the scientist seeking the most recent and authoritative information concerning this group, to the nurseryman who wishes to handle his varieties accurately and intelligently, and to the cultivator who would like to grow plums successfully. Illustrated. 391 pages. 5 x 7 inches. Cloth. \$1.50

Fruit Harvesting, Storing, Marketing

By F. A. WAUGH. A practical guide to the picking, storing, shipping and marketing of fruit. The principal subjects covered are the fruit market, fruit picking, sorting and packing, the fruit storage, evaporation, canning, statistics of the fruit trade, fruit package laws, commission dealers and dealing, cold storage, etc., etc. No progressive fruit grower can afford to be without this most valuable book. Illustrated. 232 pages. 5 x 7 inches. Cloth. \$1.00

Systematic Pomology

By F. A. WAUGH, professor of horticulture and landscape gardening in the Massachusetts agricultural college, formerly of the university of Vermont. This is the first book in the English language which has ever made the attempt at a complete and comprehensive treatment of systematic pomology. It presents clearly and in detail the whole method by which fruits are studied. The book is suitably illustrated. 288 pages. 5 x 7 inches. Cloth. \$1.00

