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DISEASES AND PARASITES OF THE BOBWHITE

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Abstract:

The authors' experiences with disease and parasite problems of wild and pen-raised bobwhites are given. Information extrapolated from an extensive literature review is presented in tabular form. Diseases and parasites of bobwhites, location in the bird of the lesion or parasite, and geographic areas of occurrence are noted.

A variety of information concerning diseases and parasites of the bobwhite is available in the technical literature. The majority of mortality reports deal with pen-raised birds, but limited information is available concerning wild bobwhites. Basic publications related to diseases and parasites of bobwhites include: Biester and Schwarte's (1965) *Diseases of Poultry*; Davis, Anderson, Karstad, and Trainer's (1971) *Infectious and Parasitic Diseases of Wild Birds*; the section in Stoddard's (1931) book concerning diseases and parasites of the bobwhite; and Kellogg and Calpin's (1971) checklist of diseases and parasites reported from the bobwhite.

Today, 40 years after Stoddard's (1931) initial disclosure of diseases and parasites affecting quail, there is still little information

as to the role diseases and parasites play in the high annual losses sustained by wild bobwhite populations. Blackhead, tularemia, and ulcerative enteritis (Stoddard 1961, Green and Wate 1929, Shillinger and Morley 1937) have been reported to cause death in wild bobwhites. This paucity of information probably is due to the small number of wild bobwhites that are submitted to diagnostic laboratories.

Only 16 wild bobwhites have been submitted to the Southeastern Cooperative Wildlife Disease Study (SCWDS) for diagnosis during the last 5 years. Deaths were attributed to the following causes: trauma (6), e.g. flying into solid objects; egg yolk peritonitis (3), i.e. the ovum had dropped into the body cavity rather than the oviduct and caused fatal peritonitis; pesticide poisoning (3); aortic rupture (1); proliferation of the "horny" lining of the gizzard (1); fowl pox (1); and fungus infection in the lungs, kidneys, and body cavity (1).

During various research studies we have examined hundreds of wild bobwhites, which were shot or trapped, and have noted only 2 parasite problems. Severe distention of the small intestine by tapeworms has been observed, and proventriculitis caused by large numbers of nematodes (Tetrameres sp.) has been encountered rarely. The proventricular wall in such cases was thickened to the extent that the lumen was almost occluded. Whether or not these problems would have caused death is speculative.

Many disease and parasite problems are associated with pen-raised bobwhites. In our experience the most common problems causing death of pen-raised bobwhites are: quail bronchitis, ulcerative enteritis, blackhead, and infection of the crop by the nematode Capillaria contorta. Problems occasionally occur with the proventricular nematode Dispharynx nasuta and with coccidia, but seldom do these entities alone cause death.

The diseases and parasites of wild and pen-raised bobwhites are presented in Tables 1-4. Location in the bird of lesion or parasite and geographic area of occurrence are given. A few older reports of diseases and parasites listed in the tables are now considered erroneous. The chicken coccidia Eimeria acervulina, E. mitis, and E. tenella have been reported from the bobwhite, but these records are in error (Pellerdy 1965). Eimeria dispersa is the only specific coccidium reported from the bobwhite in recent literature. At least 2 additional species of coccidia, as yet undescribed in the literature, infect the bobwhite (SCWDS, unpublished data). A blood parasite, Plasmodium elongatum, was erroneously reported as Plasmodium praecox in earlier literature (Cram et al. 1931, Wetmore 1941) and an acanthocephalan referred to as Disteganius colini was reported but never described (Lehmann 1953).

The tables and references listed should prove useful to laymen and technical personnel as well. Diagnosticians often lack familiarity with bobwhite diseases and therefore prefer not to examine them. The information included here should help alleviate this problem.

Table 1. Tabulation of viral, bacterial, and mycotic diseases reported from the bobwhite.

Disease (organism)	Location or lesion area	Type of report and geographical location if given*	Refer. No.
VIRAL DISEASES			
Equine encephalitis	brain	exp. inf. sp. rev. exp. inf. exp. inf.	137 75 156 146
Fowl pox	head, under wings, legs, feet, and inside mouth and esophagus	case rept.-Mexico case rept.-Ga., S.C. gen. rev. gen. rev.-southern U.S.	67 133 98 129
Newcastle disease	no lesions, but developed anti- bodies	gen. rev., exp. inf.	65
Quail bronchitis	respiratory tract	case rept.-W.Va. case rept.-Texas gen. rev. exp. inf. exp. inf.-Texas sp. rev. gen. rev. exp. inf., case rept.-Va. sp. rev.	105 58 132 57 59 77 70 55 56
BACTERIAL DISEASES			
Avian tuberculosis (<u>Mycobacterium avium</u>)	viscera	gen. rev. gen. rev.	129 127
Botulism (<u>Clostridium botulinum</u>)	nervous system	exp. inf.-N.Y.	15

Table 1. (continued)

Disease (organism)	Location or lesion area	Type of report and geographical location if given*	Refer. No.
BACTERIAL DISEASES (continued)			
Chronic respiratory disease (<u>Mycoplasma gallisepticum</u>)	lungs and air sacs	unsuccessful exp. inf. case rept.	159 95
Erysipelas (<u>Erysipelothrix rhusiopathiae</u>) (= <u>E. insidiosus</u>)	heart and liver	case rept.-Iowa	142
<u>Escherichia freundii</u>	lower intestine	case rept.	61
Fowl cholera (<u>Pasteurella multocida</u>)	heart and liver	gen. rev. unsuccessful exp. inf.	129 17
Fowl typhoid (<u>Salmonella gallinarum</u>)	heart and liver	gen. rev.	129
Paratyphoids <u>Salmonella bareilly</u>	lower intestine	case rept.-Ill.	122
<u>Salmonella bredney</u>	lower intestine	case rept. case rept.	47 48
<u>Salmonella newport</u>	lower intestine	case rept.-Ill.	71
<u>Salmonella oranienburg</u>	liver	case rept.-Ky.	62
<u>Pseudotuberculosis</u> (<u>Pasteurella pseudotuberculosis</u>)	viscera	case rept.-England sp. rev.	24 132
Pullorum (<u>Salmonella pullorum</u>)	liver and lungs	case rept. exp. inf.	64 129
Tularemia (<u>Pasteurella tularensis</u>) (= <u>P. tularensis</u>) (= <u>Bacterium tularensis</u>) (= <u>Francisella tularensis</u>)	lungs, liver, and spleen	case rept.-Minn. exp. inf. gen. rev. sp. rev., case rept.-Mo.(?) gen. rev.	73 108 72 109 129

Table 1. (continued)

Disease (organism)	Location or lesion area	Type of report and geographical location if given*	Refer. No.
BACTERIAL DISEASES (continued)			
Ulcerative enteritis			
	lower intestine and liver	sp. rev.-Ala., D.C., Kan., Mass., Pa., Va., Nova Scotia	103
		sp. rev.-Va.	68
		case rept.-Ga.	133
		case rept.-Md.	120
		gen. rev.	126
		gen. rev.	98
		gen. rev.	106
		case rept.-Ill. (?)	3
		sp. rev., exp. inf.	128
		gen. rev.-southern U.S.	99
		sp. rev.	100
		exp. inf.	101
		gen. rev.	129
		sp. rev.	6
		gen. rev.	127
		exp. inf.	7
		sp. rev., exp. inf.	60
		exp. inf.	23
		exp. inf., case rept.-Md.	102
		exp. inf. (drug study)	87
		exp. inf. (drug study)	88
		exp. inf. (drug study)	89
		exp. inf. (drug study)	86
		exp. inf.	112
		exp. inf.	113
		exp. inf. (drug study)	116
		gen. rev.-Wis.	81
		gen. rev.	70

Table 1. (continued)

Disease (organism)	Location or lesion area	Type of report and geographical location if given*	Refer. No.
BACTERIAL DISEASES (continued)			
Ulcerative enteritis	lower intestine and liver	sp. rev. case rept.-S.C. exp. inf.-Ga. gen. rev. exp. inf.-Ga. gen. rev. gen. rev.	114 84 18 141 51 115 139
MYCOTIC DISEASES			
Aspergillosis (<u>Aspergillus fumigatus</u>)	respiratory tract	gen. rev. case rept.-Va. gen. rev.	72 133 98
Crop mycosis (<u>Candida albicans</u>) (= <u>Oidium albicans</u>)	esophagus and crop	gen. rev. gen. rev.	129 132

* Abbreviations used: gen. rev. = mentioned in a general review of diseases; sp. rev. = review of that specific disease or a specific parasite description; exp. inf. = experimental infection; case rept. = case report or survey.

Table 2. Tabulation of protozoan diseases reported from the bobwhite.

Organism	Location or lesion area	Type of report and geographical location if given*	Refer. No.
<u>Chilomastix</u> sp.	lower intestine	case rept.-Ga.	50
<u>Eimeria acervulina</u> (?)	small intestine	case rept.-Ohio	155
		case rept.-Ohio	140
		gen. rev.	129
		gen. rev.	127
		gen. rev.	74
<u>Eimeria dispersa</u>	small intestine and ceca	exp. inf.	136
		gen. rev.	138
		case rept.-Ohio	155
		case rept.-Ohio	140
		gen. rev.	129
		gen. rev.	16
		gen. rev.	127
		gen. rev.	74
		case rept.-Okla.	130
		gen. rev., sp. rev.	91
		gen. rev., sp. rev.	117
<u>Eimeria mitis</u> (?)	small intestine and ceca	gen. rev.	129
		gen. rev.	127
<u>Eimeria tenella</u> (?)	ceca	case rept.-Ohio	155
		case rept.-Ohio	140
		gen. rev.	129
		gen. rev.	127
		gen. rev.	74
<u>Eimeria</u> spp.	lower intestine	case rept.-Fla., Ga., Miss., N.C., S.C., Tenn.	45
		gen. rev.	98

Table 2. (continued)

Organism	Location or lesion area	Type of report and geographical location if given*	Refer. No.
<u>Eimeria</u> spp. (continued)	lower intestine	case rept.-Miss. gen. rev., sp. rev. gen. rev., sp. rev. gen. rev.	145 91 117 141
<u>Haemoproteus</u> sp.	erythrocytes	case rept.-Md. sp. rev. (survey in N.Mex. neg.) sp. rev. (survey in Iowa neg.)	154 21 123
<u>Hexamita</u> sp.	ceca	gen. rev.	132
<u>Histomonas meleagridis</u>	ceca and liver	gen. rev. gen. rev. gen. rev. gen. rev. gen. rev. gen. rev. gen. rev. case rept.	45 126 98 99 129 127 134
<u>Plasmodium elongatum</u> (= <u>Plasmodium praecox</u> of Cram et al. 1931)	erythrocytes	case rept.-Ga., S.C. sp. rev., exp. inf.-Ga. sp. rev., exp. inf.-Md. case rept.-Ga. case rept.-Ga., Md.	84 85 94 45 154
<u>Plasmodium</u> sp.	erythrocytes	exp. inf. sp. rev. (survey in N.Mex. neg.) sp. rev. (survey in Iowa neg.)	153 21 123
<u>Trichomonas gallinae</u>	esophagus and crop	exp. inf.	92
<u>Trichomonas</u> sp.	ceca	case rept.-Va. gen. rev., case rept.-Va.	1 45

Table 2. (continued)

Organism	Location or lesion area	Type of report and geographical location if given*	Refer. No.
<u>Trichomonas</u> sp. (continued)	ceca	gen. rev.	98
		gen. rev.	129
		gen. rev.	127

* Abbreviations used: gen. rev. = mentioned in a general review of diseases; sp. rev. = review of that specific disease or a specific parasite description; exp. inf. = experimental infection; case rept. = case report or survey.

Table 3. Tabulation of helminths reported from the bobwhite.

Helminth	Location or lesion area	Type of report and geographical location if given*	Refer. No.
TREMATODES			
<u>Harmostomum</u> sp. (= <u>Brachylaema</u> sp.)	small intestine	case rept.-Md., N.C.	45
CESTODES			
<u>Davainea</u> sp.	small intestine	case rept.-Texas	90
<u>Hymenolepis cantaniana</u> (= <u>Staphylepis cantaniana</u>)	small intestine	case rept.-Md. sp. rev., case rept.-Md. exp. inf.	79 45 80
<u>Hymenolepis carioca</u> (= <u>Echinolepis carioca</u>)	small intestine	exp. inf., case rept. sp. rev., case rept.-Fla., Ga., Va. case rept.-Miss. case rept.-Miss. case rept.-Ga.	44 45 144 145 84
<u>Hymenolepis</u> sp.	small intestine	case rept.-Ohio case rept.-Ohio case rept.-Texas	155 140 110
<u>Paricterotaenia</u> sp.	small intestine	case rept.-Texas case rept.-Texas case rept.-Texas	151 148 90
<u>Raillietina cesticillus</u> (= <u>Davainea cesticillus</u>)	small intestine	exp. inf., case rept. case rept.-Fla. sp. rev., case rept.-Fla., Ga., Miss., Tenn. case rept.-Texas case rept.-Miss.	44 135 45 147 145

Table 3. (continued)

Helminth	Location or lesion area	Type of report and geographical location if given*	Refer. No.
CESTODES			
<u>Raillietina cesticillus</u> (continued)	small intestine	case rept.-Texas	151
		case rept.-Fla., Ga.	84
		case rept.-Tenn.	14
<u>Raillietina colini</u>	small intestine	sp. rev., case rept.-Texas	147
		case rept.-Texas	151
		case rept.-Texas	148
		sp. rev.	125
<u>Raillietina klebergi</u>	small intestine	sp. rev., case rept.-Texas	148
		case rept.-Texas	150
		case rept.-Texas	90
		sp. rev.	125
<u>Raillietina minuta</u>	small intestine	sp. rev., case rept.-Texas	148
		case rept.-Texas	150
		case rept.-Texas	90
		sp. rev.	124
<u>Raillietina tetragona</u>	small intestine	sp. rev., case rept.-Fla., Ga., S.C., Va.	45
		case rept.-Texas	148
		case rept.-Texas	110
		case rept.-Texas	90
<u>Raillietina</u> sp.	small intestine	case rept.-Texas	110
		case rept.-Fla., Ga., S.C.	84
		case rept.-Tenn.	14
<u>Rhabdometra odiosa</u>	small intestine	sp. rev., case rept.-Fla., Ga.	78
		sp. rev., case rept.-Fla., Ga.	45

Table 3. (continued)

Helminth	Location or lesion area	Type of report and geographical location if given*	Refer. No.
CESTODES (continued)			
<u>Rhabdometra odiosa</u> (continued)	small intestine	case rept.-Miss. case rept.-Miss. case rept.-Texas case rept.-Texas case rept.-N.C. case rept.-Texas case rept.-Ill. case rept.-Tenn.	144 145 151 148 104 90 19 14
<u>Rhabdometra</u> spp.	small intestine	case rept.-Ga. case rept.-Tenn.	84 14
ACANTHOCEPHALANS			
<u>Mediorhynchus bakeri</u>	small intestine	case rept.-Fla.	20
<u>Mediorhynchus colini</u> (= <u>Disteganius colini</u>)	small intestine	sp. rev., case rept.-Texas case rept.-Texas case rept.-Texas	149 110 90
<u>Onicola canis</u>	immature worms encysted in connective tissue outside crop and esophagus	case rept.-N.C., Mexico	37
NEMATODES			
<u>Aproctella stoddardi</u>	free in body cavity	sp. rev., case rept.-Fla., Ga. sp. rev., case rept.-Fla., Ga., S.C. sp. rev.	45 43 2

Table 3. (continued)

Helminth	Location or lesion area	Type of report and geographical location if given*	Refer. No.
NEMATODES (continued)			
<u>Ascaridia compar</u>	small intestine	sp. rev. case rept.-Fla.	29 193
<u>Ascaridia lineata</u>	small intestine	case rept.-Ga.	45
<u>Aulonocephalus guaricensis</u>	ceca	sp. rev., case rept.-Cuba sp. rev., case rept.-Cuba	4 5
<u>Aulonocephalus lindquisti</u>	ceca	case rept.-Texas case rept.-Texas case rept.-Texas	151 148 90
<u>Capillaria annulata</u>	crop	case rept.-Fla. case rept.-Va. gen. rev. gen. rev., sp. rev.	135 45 106 42
<u>Capillaria contorta</u>	crop	gen. rev., case rept.-N.J. exp. inf. gen. rev., sp.rev.-N.C. sp. rev. case rept. (drug study)-N.Y. case rept. (drug study)-N.Y. case rept.-Ga., S.C. case rept. (drug study)-Ga. case rept. (drug study)-Ga.	34 45 42 152 26 27 84 52 53
<u>Capillaria obsignata</u> (= <u>C. retusa</u> of Cram et al. 1931) (= <u>C. columbae</u> of Levine 1938)	small intestine and ceca	exp. inf. exp. inf. sp. rev. case rept. (drug study)-Ga.	45 93 121 53

Table 3. (continued)

Helminth	Location or lesion area	Type of report and geographical location if given*	Refer. No.
NEMATODES (continued)			
<u>Capillaria</u> spp.	crop	gen. rev.	141
<u>Cheilospirura spinosa</u> (= <u>Acuaria spinosa</u>)	under horny gizzard lining	exp. inf. sp. rev., exp. inf. sp. rev., case rept.-Tenn., Va. gen. rev. case rept.-Fla. case rept.-Tenn.	31 36 45 129 84 14
<u>Cyrnea colini</u> (= <u>Seurocyrnea colini</u>)	proventricular-gizzard junction	sp. rev., case rept.-Ga. case rept.-Pa. (zoo) case rept.-N.J. sp. rev., case rept.-Ala., Fla., Ga., Miss., N.C., S.C. sp. rev., exp. inf. case rept.-Ohio case rept.-Ohio sp. rev., exp. inf. case rept.-Miss. sp. rev., case rept.-Cuba case rept.-Fla., Ga., S.C. sp. rev., case rept.-Cuba	29 22 8 45 36 155 140 41 145 4 84 5
<u>Cyrnea</u> sp. (= <u>Seurocyrnea</u> sp.)	proventricular-gizzard junction	case rept.-Texas case rept.-Texas case rept.-La.	90 151 107
<u>Diplotriaenoides minutus</u>	body cavity	case rept.-Fla.	143
<u>Dispharynx nasuta</u> (= <u>Dispharynx spiralis</u>)	proventriculus	case rept.-N.J. exp. inf.	8 35

Table 3. (continued)

Helminth	Location or lesion area	Type of report and geographical location if given*	Refer. No.
NEMATODES (continued)			
<u>Dispharynx nasuta</u> (continued) (= <u>Dispharynx spiralis</u>)	proventriculus	sp. rev., exp. inf. gen. rev., case rept.-N.J. exp. inf. case rept.-Ohio gen. rev., case rept.-N.C. case rept.-Ohio gen. rev. gen. rev., case rept.-N.Y. case rept.-Ill. case rept.-Fla., Ga. case rept.-La.	36 37 38 155 97 140 129 69 19 84 107
<u>Gongylonema ingluvicola</u>	esophagus and crop	sp. rev., case rept.-Ga. gen. rev.-Cuba sp. rev.-Cuba case rept.-Fla.	45 118 4 143
<u>Habronema bialatum</u> (= <u>Spiroptera bialata</u>) (= <u>S. tenuis</u>)	proventriculus		
<u>Habronema pileata</u>	proventriculus	sp. rev., case rept.-Ga. case rept.-Miss. case rept.-Miss.	45 144 145
<u>Heterakis bonasae</u>	ceca	sp. rev., case rept.-Ala., Fla., Ga., Mass., Miss., N.C., S.C. case rept.-Ohio case rept.-Ohio case rept.-Miss. case rept.-Ill. case rept.-Fla., Ga. case rept.-Tenn.	45 155 140 145 19 84 14

Table 3. (continued)

Helminth	Location or lesion area	Type of report and geographical location if given*	Refer. No.
NEMATODES (continued)			
<u>Heterakis gallinae</u> (= <u>H. gallinarum</u>)	ceca	sp. rev. case rept.-Pa. (zoo) sp. rev., case rept.-Va. case rept.-Ohio case rept.-Ohio gen. rev. case rept.-Miss. case rept.-Miss. case rept.-Texas case rept.-Ill. sp. rev., case rept.-Cuba case rept.-Ga., S.C. sp. rev.-Cuba case rept. (drug study)-Ga. sp. rev., exp. inf.-Ga. sp. rev., exp. inf.-Md. case rept.-Fla.	29 22 45 155 140 129 144 145 110 19 4 84 5 53 85 94 143
<u>Heterakis vesicularis</u> (= <u>H. papillosa</u>)	ceca		
<u>Oxyspirura mansoni</u>	eyes	sp. rev., case rept.-Cuba sp. rev., case rept.-Cuba	4 5
<u>Oxyspirura matogrosensis</u>	eyes	case rept.-La.	107
<u>Physaloptera</u> sp.	immature worms en- cysted in breast muscle	case rept.-Wis. case rept.-La.	37 54
<u>Strongyloides avium</u>	ceca and small intestine	sp. rev., exp. inf. gen. rev. sp. rev.	32 33 45

Table 3. (continued)

Helminth	Location or lesion area	Type of report and geographical location if given*	Refer. No.
NEMATODES (continued)			
<u>Subulura brumpti</u>	ceca	case rept.-Pa. (zoo) case rept.-Miss. case rept.-Miss. case rept.-Texas	22 144 145 110
<u>Subulura strongylina</u>	ceca	sp. rev., case rept.-Ga., N.C. case rept.-Ohio case rept.-Ohio	45 155 140
<u>Syngamus americana</u> (?)	trachea	checklist	158
<u>Syngamus trachea</u>	trachea	gen. rev. sp. rev., case rept.-Va. gen. rev. case rept.-Miss. case rept.-Miss. case rept.-Texas case rept.-Texas	34 45 129 144 145 151 90
<u>Tetrameres americana</u> (= <u>Tropisurus americanus</u>)	glands of proventriculus	sp. rev., exp. inf. sp. rev., case rept.-Ga., Va. case rept.-Fla.	36 45 84
<u>Tetrameres pattersoni</u> (= <u>Tropisurus pattersoni</u>)	glands of proventriculus	sp. rev., case rept.-Md., N.C. sp. rev., exp. inf.	39 40
<u>Tetrameres</u> sp.	glands of proventriculus	gen. rev., case rept.-N.C.	37
<u>Trichostrongylus tenuis</u> (= <u>T. pergracilis</u>)	ceca	case rept.-Ga. sp. rev., case rept.-Ga. gen. rev.	28 29 30

Table 3. (continued)

Helminth	Location or lesion area	Type of report and geographical location if given*	Refer. No.
NEMATODES (continued)			
<u>Trichostrongylus tenuis</u> (= <u>T. pergracilis</u>)	ceca	sp. rev., case rept.-Ala., Fla., Ga., Miss., S.C., Tenn. sp. rev. gen. rev. case rept.-Miss. case rept.-Fla., Ga., S.C. case rept.-La.	45 46 129 145 84 107

*Abbreviations used: gen. rev. = mentioned in a general review of diseases; sp. rev. = review of that specific disease or a specific parasite description; exp. inf. = experimental infection; case rept. = case report or survey.

Table 4. Tabulation of arthropods reported from the bobwhite.

Arthropod	Type of report and geographical location if given*	Refer. No.
MITES		
<u>Androlaelaps</u> sp. (= <u>Atricholaelaps</u> sp.)	checklist-N.C.	119
<u>Boydaiia colini</u>	sp. rev., case rept.-Ill.	11
<u>Haemogamasus</u> sp.	checklist-N.C.	119
<u>Megninia cubitalis</u>	case rept.-Ill.	11
<u>Megninia</u> sp.	case rept.-Fla. checklist-Ohio	133 119
<u>Neoschoengastia americana</u> (= <u>Neoshongastia americana</u>)	checklist-Va. gen. rev.	119 9
<u>Ornithonyssus sylviarum</u> (= <u>Liponyssus placificus</u>)	case rept.-Fla.	133
<u>Ornithonyssus</u> sp. (= <u>Liponyssus</u> sp.)	gen. rev.	129
<u>Pterolichus</u> sp.	case rept.-Ill.	11
<u>Speleognathidae</u>	case rept.-Md.	25
<u>Trombicula</u> (<u>Eutrombicula</u>) <u>alfreddugesi</u> (= <u>Trombicula irritans</u>)	case rept.-Fla.	133
TICKS		
<u>Argas miniatus</u>	checklist	13
<u>Amblyomma americanum</u>	checklist-Va. checklist case rept.-Texas	119 13 110

Table 4. (continued)

Arthropod	Type of report and geographical location if given*	Refer. No.
TICKS (continued)		
<u>Amblyomma americanum</u> (continued)		
	case rept.-Texas	111
	case rept.-Va.	131
<u>Amblyomma cajennense</u>	case rept.-Texas	76
<u>Amblyomma maculatum</u>	checklist-Ga.	119
	esp. inf.	13
	case rept.-Texas	76
	case rept.-Texas	90
	case rept.-La.	107
<u>Amblyomma</u> sp.	case rept.-Ga.	133
<u>Dermacentor variabilis</u>	case rept.-Ill.	11
<u>Haemaphysalis chordeilis</u>	checklist	13
<u>Haemaphysalis leporispaulstris</u>	case rept.-Fla., Ga.	133
	checklist-Fla., Ga., N.C., S.C., Va., Tenn.	119
	case rept.-Ohio	82
	checklist	13
	case rept.-Texas	110
	case rept.-Texas	76
	case rept.-Texas	90
	case rept.-Texas	111
	case rept.-Ill.	11
	gen. rev.	9
	case rept.-Va.	131
<u>Ixodes brunnes</u>	case rept.-Va.	131
<u>Ixodes diversifossus</u>	checklist-Md.	119

Table 4. (continued)

Arthropod	Type of report and geographical location if given*	Refer. No.
TICKS (continued)		
<u>Ixodes</u> sp.	case rept.-Fla.	133
<u>Rhipicephalus</u> sp.	case rept.-Fla.	133
LICE		
<u>Brueelia illustris</u> (= <u>Brueelia illustris</u>)	case rept.-Texas	111
<u>Colinicola numidiana</u> (= <u>Lagopoecus numidianus</u>) (= <u>Lipecurus aberrans</u>)	case rept.-Fla. case rept.-Ohio checklist-Md., Ohio, S.C. checklist-Fla., Ga., Ohio, Okla. case rept.-Texas case rept.-Texas case rept.-Texas case rept.-Texas checklist case rept.-Ill. case rept.-West Texas	133 155 119 63 110 76 90 111 96 11 157
<u>Cuculotogaster maculipes</u>	checklist	96
<u>Goniodes gigas</u> (= <u>Goniocotes gigas</u>)	case rept.-Ga.	133
<u>Goniodes mamillatus</u> (= <u>Goniodes mamillatus</u>)	case rept.-Fla., Ga. gen. rev.	133 129
<u>Goniodes ortygis</u>	case rept.-Ohio checklist-Md., N.C., Ohio, S.C., Va.	155 119

Table 4. (continued)

Arthropod	Type of report and geographical location if given*	Refer. No.
LICE (continued)		
<u>Goniodes ortygis</u> (continued)	checklist-Ala., Fla., Ga., Mont., Ohio, Ore., Texas, Wash.	63
	case rept.-Texas	110
	case rept.-Texas	111
	case rept.-Texas	76
	case rept.-Texas	90
	checklist	96
	case rept.-Ill.	11
	case rept.-West Texas	157
	case rept.-La.	107
	checklist-Ohio	119
	checklist	96
<u>Lipecurus caponis</u> (= <u>Lipecurus dovei</u>) (= <u>Esthiopeterum dovei</u>)	case rept.-Miss., N.C., Okla., Texas	157
<u>Menacanthus pricei</u>	case rept.-Fla.	133
<u>Menacanthus spp.</u>	case rept.-Ohio	155
	checklist-Md., Ohio, Va.	119
	checklist-Okla.	63
	case rept.-Texas	110
	case rept.-Texas	76
	case rept.-Texas	90
	case rept.-Texas	111
	case rept.-Ill.	11
<u>Otidoecus dissimilis</u> (= <u>Lipecurus dissimilis</u>)	case rept.-Fla., Ga. checklist-Va. gen. rev.	133 119 129

Table 4. (continued)

Arthropod	Type of report and geographical location if given*	Refer. No.
LICE (continued)		
<u>Oxylipeurus clavatus</u>	case rept.-Fla., Ga.	133
(= <u>Esthiopterum clavatus</u>)	case rept.-Ohio	155
(= <u>Lipeurus clavatus</u>)	checklist-Md., Pa., Va.	119
(= <u>Oxylipeurus cubanus</u>)	gen. rev.	129
	checklist-Md., Okla.	63
	case rept.-Texas	110
	case rept.-Texas	76
	case rept.-Texas	90
	case rept.-Texas	111
	checklist	96
	case rept.-Ill.	11
	case rept.-West Texas	157
LOUSE FLIES		
<u>Icosta americana</u>	gen. rev.-North America	10
(= <u>Lynchia americana</u>)		
<u>Microlynchia pusilla</u>	case rept.-Texas	110
	gen. rev.-North America	10
	case rept.-Texas	76
	case rept.-Texas	90
	case rept.-Texas	111
<u>Ornithomyia anchineuria</u>	checklist-Pa.	119
(= <u>Ornithomyia fringillina</u>)	gen. rev.-North America	10
FLEAS		
<u>Echidnophaga gallinacea</u>	case rept.-Ga.	133
	gen. rev.-Eastern U.S.	66

Table 4. (continued)

Arthropod	Type of report and geographical location if given*	Refer. No.
FLEAS (continued)		
<u>Echidnophaga gallinacea</u> (continued)	case rept.-Texas	110
	case rept.-Texas	76
	case rept.-Texas	90
	gen. rev.	9
<u>Orchopeas howardi</u>	case rept.-Texas	110
	case rept.-Texas	111

* Abbreviations used: gen. rev. = mentioned in a general review of diseases; sp. rev. = review of that specific disease or a specific parasite description; exp. inf. = experimental infection; case rept. = case report or survey.

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