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A Guide to the ticks of Mississippi

Jerome Goddard

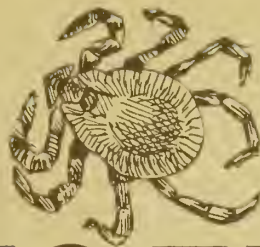
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A GUIDE TO THE TICKS OF MISSISSIPPI



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A GUIDE TO THE TICKS OF MISSISSIPPI

Members of the superfamily Ixodoidea, or ticks, are acarines that feed obligately on the blood of mammals, reptiles and birds. They have a leathery, undifferentiated body with no distinct head, but the mouth parts together with the basis capituli form a headlike structure. Mature ticks and nymphs have four pair of legs, and the larvae have three pair.

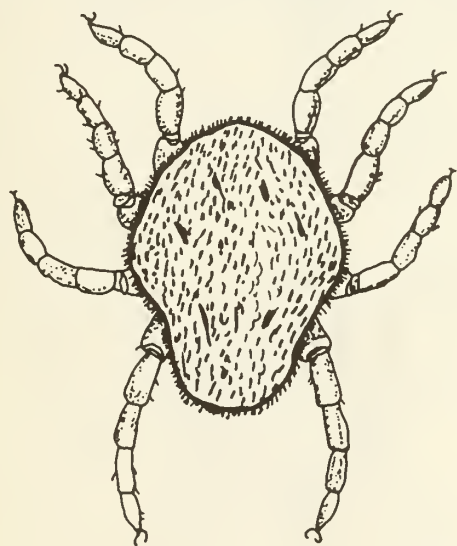
The two major families of ticks recognized in North America—(Figure 1) are Ixodidae (hard ticks) and Argasidae (soft ticks). Hard ticks are scutate with obvious sexual dimorphism and the blood-fed females are capable of enormous expansion. Their mouthparts are anterior and visible from dorsal view. Soft ticks are nonscutate without obvious sexual dimorphism and are mainly adapted for feeding rapidly and leaving the host promptly. Their mouthparts are generally subterminal and not visible from dorsal view.

Ticks are of significant medical and veterinary importance, and knowledge of species present in a given area is important to physicians, veterinarians and livestock personnel. Several projects conducted by wildlife researchers have cited tick records from Mississippi (Andrews et al., 1980; Demarais, 1979;

Handrick, 1981; Jacobson and Hurst, 1979; Prestwood, 1968 and Smith, 1977). Other medical or veterinary projects have reported tick records from the state (Archer, 1946; Carpenter et al., 1946; Nause and Norment, 1984; Norment et al., 1985; Philip and White, 1955; Rhodes and Norment, 1979). There is a paucity of information on the distribution and abundance of ticks in Mississippi.

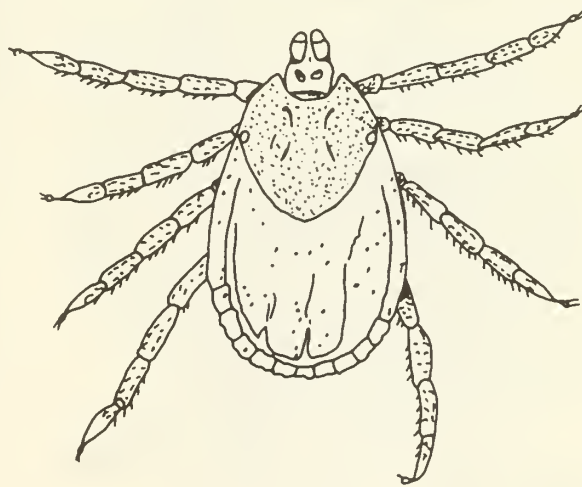
Hard ticks have a four-stage life history. Some ticks complete their development on only one or two hosts, but most Mississippi ticks have a three-host life cycle. A fully fed female tick drops from the host animal to the ground and lays from 5,000 to 18,000 eggs. The eggs hatch in about 35 days into a six-legged seed-tick stage, which feeds predominantly on small animals. The fully fed seed ticks drop to the ground and transform into eight-legged nymphs. These nymphs seek an animal host and likewise feed and drop to the ground. They then transform into the adult stage, thus completing the life cycle.

The biology of soft ticks differs from that of hard ticks. Adult soft ticks feed repeatedly whereas hard ticks feed once and lay eggs. Argasid females may feed



SOFT TICK

A



HARD TICK

B

Figure 1. Dorsal view of argasid and ixodid ticks.



Female Black Legged Tick



Male Black Legged Tick



Female American Dog Tick



Male American Dog Tick



Female Gulf Coast Tick



Male Gulf Coast Tick



Female Lone Star Tick



Male Lone Star Tick



Female Rabbit Tick



Male Rabbit Tick



Female Brown Dog Tick



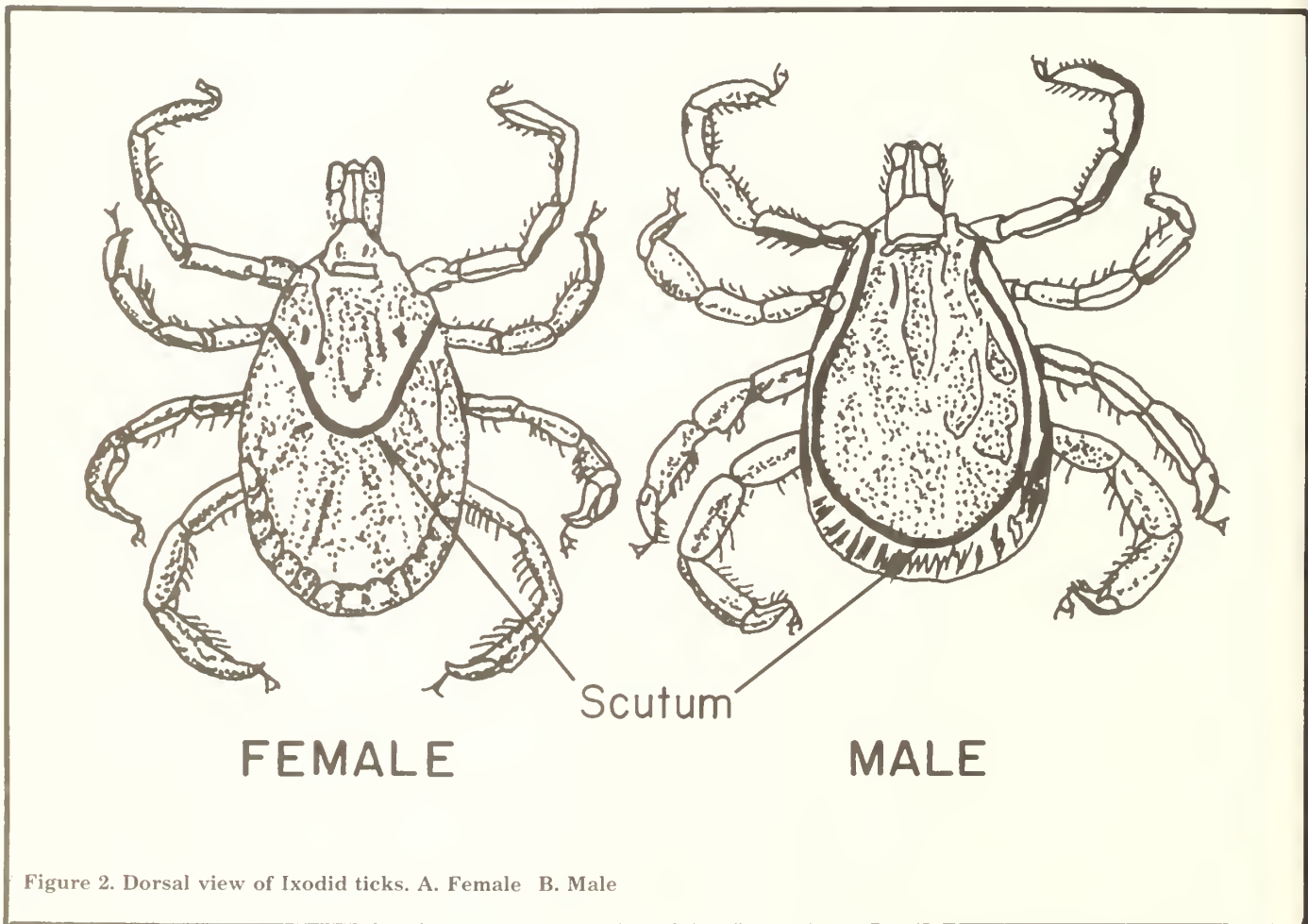
Male Brown Dog Tick

and lay eggs several times but lay fewer eggs than do hard ticks. Also, soft-tick species may undergo several nymphal molts before reaching the adult stage.

This bulletin summarizes the knowledge gained thus far on the ticks of Mississippi. The collection records and literature show 17 species as occurring or having occurred. These records come from citations in the literature, the Rocky Mountain Laboratory records, specimens in the Mississippi Entomological Museum and specimens collected by the authors throughout northern Mississippi in 1981-84. Voucher specimens representing 13 of the 17 species discussed are

deposited in the Mississippi Entomological Museum or in the National Museum of Natural History (original Rocky Mountain Laboratory specimens).

Fifteen of the species presented are Ixodidae (hard ticks), and two are Argasidae (soft ticks). The records for *Argas persicus* (Oken), the Fowl tick; *Amblyomma cajennense* (Fabricius), the Cayenne tick and *Ixodes kingi* Bishopp, the Rotund tick are questionable in that we don't have specimens available for verification. Also, *Boophilus annulatus* (Say), the Cattle tick, was eradicated during the tick eradication program of the early 1900's.



List Of Tick Species Occurring Or Having Occurred In Mississippi

Family Argasidae

Otobius megnini (Duges), Spinose Ear tick.

**Argas persicus* (Oken), Fowl tick.

Family Ixodidae

Boophilus annulatus (Say), Cattle tick, eradicated

Amblyomma americanum (Linnaeus), Lone Star tick

**Amblyomma cajennense* (Fabricius), Cayenne tick

Amblyomma maculatum (Koch), Gulf Coast tick

Amblyomma tuberculatum Marx, Gopher Tortoise tick

Dermacentor albipictus Packard, Winter tick

Dermacentor variabilis (Say), American Dog tick
Haemaphysalis leporispalustris (Packard), Rabbit tick

Ixodes brunneus Koch, No Common Name

Ixodes cookei Packard, No Common Name

Ixodes dentatus Marx, No Common Name

**Ixodes kingi* Bishopp, Rotund tick

Ixodes scapularis Say, Black Legged tick

Ixodes texanus Banks, Raccoon tick

Rhipicephalus sanguineus (Latreille), Brown Dog tick

*Occurrence in Mississippi questionable.

Identification Guide To Ticks^{1, 2}

Affecting Man In Mississippi, By Season Of The Year

Winter (Dec - Jan)

If adult ticks probably *Ixodes scapularis*

Early Spring (Feb - Mar)

If adult ticks probably *Ixodes scapularis* or
Amblyomma americanum

If nymphal ticks probably *Amblyomma americanum*

Late Spring (Apr - May)

If adult ticks probably *Amblyomma americanum* or *Amblyomma maculatum*

If adult ticks possibly *Dermacentor variabilis*

If nymphal ticks probably *Amblyomma americanum*

Early Summer (Jun - Jul)

If adult ticks and bite man could be either

Amblyomma americanum, *Amblyomma maculatum*
or *Dermacentor variabilis*

If adult ticks, in or around homes with dogs and
don't bite man then *Rhipicephalus sanguineus*

If nymphal ticks probably *Amblyomma americanum*

Late Summer (Aug - Sep)

If adult ticks and bite man probably *Dermacentor variabilis*

If adult ticks in and around homes and don't bite
man then *Rhipicephalus sanguineus*.

If larval or nymphal ticks probably *Amblyomma americanum*.

Fall (Oct - Nov)

If adults possibly *Dermacentor variabilis* or *Ixodes scapularis*

If larval ticks probably *Amblyomma americanum*.

¹ Including only the five most common Mississippi ticks.

² Intended as a guide only and not for definitive identification

Key to Families and Genera of Adult Ticks

Scutum present, Capitulum terminal and conspicuous from above (Fig. 1B) Family Ixodidae
 Scutum absent, Capitulum on underside of body and inconspicuous [Fig. 1A] Family Argasidae

Family Argasidae Key to Genera of Argasidae (Mississippi)

Margin of body thick, rounded without definite sutural line; integument spinose; body plump Genus *Otobius*
 Margin of body with definite sutural line; integument not as above; body distinctly flattened dorso-ventrally Genus *Argas*

Family Ixodidae Key to Genera of Ixodidae (Mississippi)

1. Anal groove on ventor curves about the anus in front; festoons and eyes absent; scutum inornate (Fig. 4E).....Genus *Ixodes*
- 1' Anal groove on ventor curves about the anus behind or is absent; festoons present or absent; eyes present or absent; scutum ornate or inornate.....2
2. Eyes absent; second palpal segment projects laterally beyond basis capituli (Fig. 3E).....Genus *Haemaphysalis*
- 2' Eyes present; second palpal segment does not project laterally beyond basis capituli.....3
3. Basis capitulum laterally produced; scutum usually inornate (Figs. 4A,4C).....4
- 3' Basis capitulum not laterally produced; scutum usually ornate.....5
4. Spiracular plate (Stigma) oval; festoons absent (Figs. 3A, 4A)..... Genus *Boophilus*
- 4' Spiracular plate (Stigma) comma-shaped; festoons present (Figs. 4C,3F).....Genus *Rhipicephalus*
5. Second segment of palpi about as long as wide; Coxa I deeply bifid (Figs. 3C, 4B).....Genus *Dermacentor*
- 5' Second segment of palpi twice as long as wide; Coxa I not bifid (Figs. 3D, 4D).....Genus *Amblyomma*

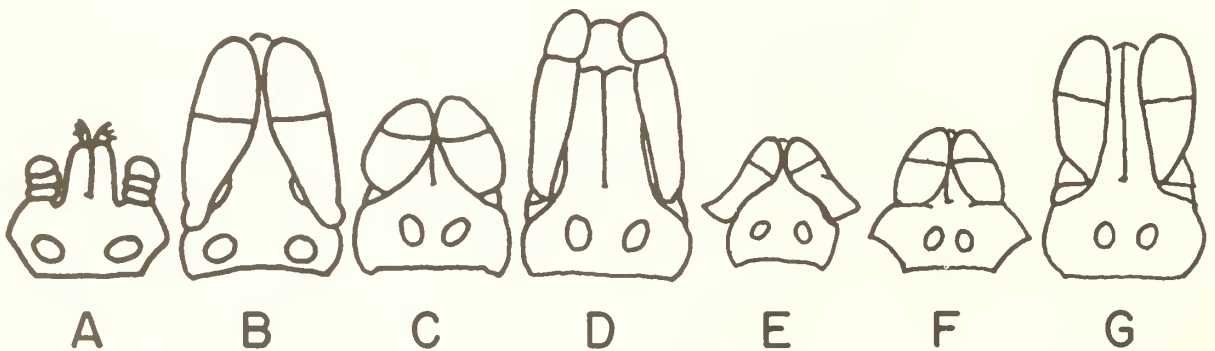


Figure 3. Characteristic capitula of several genera of ixodid ticks (dorsal view). A. *Boophilus*. B. *Ixodes*. C. *Dermacentor*. D. *Amblyomma*. E. *Haemaphysalis*. F. *Rhipicephalus*. G. *Hyalomma* (Redrawn with permission from Harwood and James 1979 Entomology in Human and Animal Health, Macmillan Co.).

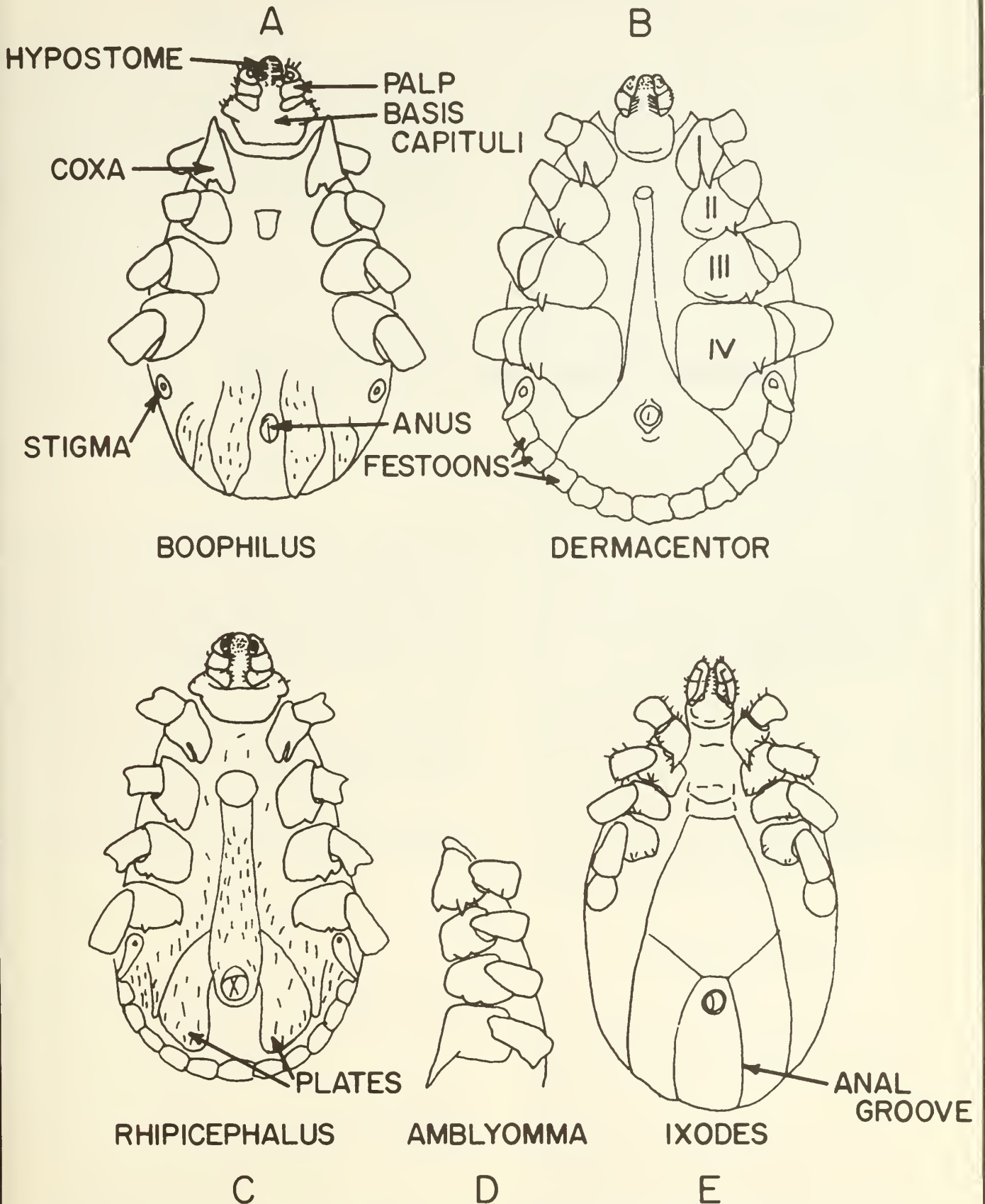


Figure 4. Ventral aspects of male ixodid ticks (Redrawn with permission from Georgi, 1974; Parasitology for Veterinarians, W. B. Saunders Co.).

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Species Annotations

Argas Persicus (Fowl Tick)

The Fowl tick is one of the most cosmopolitan poultry parasites. This species is strikingly active at night, traveling some distance to its hosts and then back to hiding places where it stays during the day. It is not known to transmit disease to humans.

Mississippi distribution: The only collection record we have is from Oktibbeha County (Ward, 1932) and its validity is questionable.

Mississippi seasonal occurrence: Unknown

Mississippi hosts: No host given.

Diagnostic characteristics of the species: Since *Argas persicus* in the U.S. actually represents a complex of species, no diagnostic characters are included here.

Voucher specimens: None available.

Otobius megnini (Ear tick)

The Ear tick is widely distributed throughout the United States and is an important parasite of horses, mules, sheep, cats, dogs and especially cattle. Nymphs occasionally may be found attached in the ears of people (Harwood and James, 1979).

Mississippi distribution: Warren County.

Mississippi seasonal occurrence: November and December.

Mississippi hosts: Cattle

Diagnostic characteristics of the species: Nymphs are the stage most often encountered and have a profusely spinose integument. Dentition of hypostome 4/4, Spiracles conical.

Voucher specimens: Mississippi Entomological Museum, Mississippi State University (MEM #8-3).

Boophilus annulatus (Cattle tick)

Boophilus annulatus was widely distributed in the southern United States in the early 1900's. It is the vector of Texas Cattle fever which is a very destructive epizootic among cattle.

We have only one collection record from Mississippi dated December 31, 1914, from Franklin County. The most important host of this tick is cattle, but early authors also listed deer, horse, mule, sheep, goat and bison.

Voucher specimens: Rocky Mountain Laboratories accession number 060956.

Amblyomma americanum (Lone star tick)

The Lone Star tick is one of the most annoying and economically important species in the United States. It is non-specific, feeding on a wide variety of birds and mammals, and often occurs in extremely large numbers. It is most abundant in the south central United States from Texas to the Atlantic coast and has been reported as a vector of several human diseases such as Rocky Mountain spotted fever, Q fever, Lyme disease, tularemia, and 'Lone Star virus' (Parker et al., 1943; Parker and Kohls, 1943; Schulze et al., 1984; Hopla and Downs, 1953; Kokernot et al., 1969). However, recent evidence suggests that *A. americanum* is not a vector of spotted fever.

Mississippi distribution: Adams, Amite, Bolivar, Chickasaw, Choctaw, Claiborne, Clay, Forrest, George, Harrison, Hinds, Jackson, Jeff Davis, Jefferson, Lafayette, Marshall, Monroe, Noxubee, Oktibbeha, Perry, Scott, Stone, Tishomingo, Warren, Wayne, Webster, Wilkinson, Winston and Yazoo counties.

Mississippi seasonal occurrence: February to November.

Mississippi hosts: cat, cottontail rabbit, cow, dog, eastern wood rat, gray squirrel, hispid cotton rat, house mouse, marsh rice rat, norway rat, opossum, raccoon, swamp rabbit, white-footed mouse, white-tailed deer and wild turkey.

Diagnostic characteristics of the species: Males with internal spur of Coxa I moderately long and scutum with inverted horseshoe markings at posterior edge; females with external spur of Coxa I distinctly longer than internal and scutum with distinct white spot.

Voucher specimens: Mississippi Entomological Museum, MSU (MEM #8-4).

Amblyomma cajennense (Cayenne tick)

The Cayenne tick occurs generally only in the extreme southern United States. All stages of this species attack man and many animals. It is not reported to transmit disease to humans in the United States.

Mississippi distribution: Bolivar County

Mississippi seasonal occurrence: Unknown

Mississippi hosts: Wild turkey (Prestwood, 1968).

Diagnostic characteristics of the species: Males with internal spur of Coxa I moderately long and scutum

with web-like design radiating from the center; Females with external spur of Coxa I distinctly longer than internal; scutum with extensive ornamentation and festoons with tubercles at posterior edge.

Voucher specimens: None available.

Amblyomma maculatum
(Gulf Coast tick)

The Gulf Coast tick is of considerable economic importance especially in relation to livestock. Adults of this species attach inside the ears of animals and produce inflammation and swelling. They readily bite people and may transmit Q fever (Philip and White, 1955). This species is most abundant along the Gulf and South Atlantic coasts. Bishopp and Hixson (1936) reported that this tick is seldom found farther than 100 miles inland; however, its distribution probably extends much farther northward (Goddard and Norment, 1983a).

Mississippi distribution: Forrest, George, Harrison, Hinds, Jackson, Jasper, Lafayette, Marion, Noxubee, Oktibbeha and Pearl River counties.

Mississippi seasonal occurrence: March through October.

Mississippi hosts: White-tail deer and cattle.

Diagnostic characteristics of the species: Coxa I with internal spur very short or insignificant; males and females with abundant ornamentation in an extensive pattern.

Voucher specimens: Mississippi Entomological Museum, MSU (MEM #8-2).

Amblyomma tuberculatum
(Gopher Tortoise tick)

The Gopher Tortoise tick is a large species that is host specific to the Gopher Tortoise, *Gopherus polyphemus*. It is of minor medical and economic importance and ordinarily does not bite people. This species mainly occurs on the sandy coastal areas of Alabama, Florida, Georgia, Mississippi and South Carolina.

Mississippi distribution: George, Pearl River and Stone counties.

Mississippi seasonal occurrence: June to September.

Mississippi hosts: Gopher Tortoise.

Diagnostic characteristics of the species: Coxa IV with both spurs very small and equal in length.

Voucher specimens: Rocky Mountain laboratories accession number 056909.

Dermacentor albipictus
(Winter tick)

The Winter tick (the southern form is sometimes called *D. nigrolineatus*), is a significant pest of horses, cattle and wild hoofed mammals. This species is active only in the late fall, winter and early spring. It mainly occurs in the northern United States; however, it is irregularly distributed in several southern states.

Mississippi distribution: Adams, Attala, Chickasaw, Choctaw, Claiborne, Clark, Harrison, Hinds, Jasper, Jefferson, Noxubee, Perry, Smith, Warren and Washington counties.

Mississippi seasonal occurrence: October to April.

Mississippi hosts: Deer, horses and mules.

Diagnostic characteristics of the species: Spurs on Coxa I not divergent and spiracular plate without obvious pointed projection. Ornate (*D. albipictus*), or inornate (*D. nigrolineatus*).

Voucher specimens: Rocky Mountain laboratories accession number 059856.

Dermacentor variabilis
(American Dog tick)

The American Dog tick is probably the most medically important tick in the United States and is the primary vector of Rocky Mountain spotted fever in the East. It also transmits tularemia and may cause tick paralysis (Harwood and James, 1979). The preferred host of the adult is the domestic dog, but it readily bites man. It occurs throughout the United States (except the Rocky Mountain region) and frequently is encountered in Mississippi.

Mississippi distribution: Benton, Choctaw, Coahoma, Clay, Forrest, George, Greene, Grenada, Hinds, Jackson, Jefferson, Lafayette, Marshall, Monroe, Noxubee, Oktibbeha, Pearl River, Prentiss, Tishomingo, Winston and Yazoo counties.

Mississippi seasonal occurrence: April through September.

Mississippi hosts: Bob white quail, cardinal, cat, cotton mouse, cottontail rabbit, dog, eastern wood rat, gray squirrel, hispid cotton rat, marsh rice rat, opossum, raccoon, white-tailed deer, and white-footed mouse.

Diagnostic characteristics of the species: Coxa I deeply bifid; spiracular plate with a distinct dorsal pointed projection.

Voucher specimens: Rocky Mountain laboratories accession number 060563.

Haemaphysalis leporispalustris
(Rabbit tick)

The Rabbit tick is a small tick that is an important parasite of rabbits and ground birds and is distributed widely throughout the United States. It seldom bites man but may be important in transmitting several diseases from mammal populations to bird populations, and vice versa.

Mississippi distribution: Forrest, Jackson, Jasper, Marshall, Oktibbeha, and Tishomingo counties.

Mississippi seasonal occurrence: April to September.

Mississippi hosts: Cottontail rabbit and swamp rabbit.

Diagnostic characteristics of the species: Inornate ticks, eyes absent, festoons present, dentition of hypostome 3/3.

Voucher specimens: Mississippi Entomological Museum, MSU (MEM #8-7).

Ixodes brunneus
(No Common Name)

Ixodes brunneus is a bird tick that occurs in North America, Europe and Africa. Distribution is sparse, and it is found mostly on migratory birds.

Mississippi distribution: Newton, Scott and Oktibbeha counties.

Mississippi seasonal occurrence: February.

Mississippi hosts: Blackbird.

Diagnostic characteristics of the species: Females and males with spurs on trochanters, internal and external spurs on Coxa I approximately equal in size.

Voucher specimens: Rocky Mountain laboratories accession number 058169.

Ixodes cookei
(No Common Name)

Ixodes cookei is distributed generally throughout the United States, and it parasitizes a wide range of medium sized mammals. It rarely bites people and is unimportant as a transmitter of human disease.

Mississippi distribution: Clay and Oktibbeha counties.

Mississippi seasonal occurrence: February to June.

Mississippi hosts: Dog and mink.

Diagnostic characteristics of the species: Female palps thick and club-like. Male and female internal spurs of Coxa I long and thin.

Voucher specimens: Rocky Mountain laboratories accession number 035037.

Ixodes dentatus
(No Common Name)

Ixodes dentatus is an important parasite of rabbits, but it also has been reported from other small mammals and birds (Lancaster, 1973). It commonly occurs in the eastern United States and is not known to transmit human diseases.

Mississippi distribution: Marshall County. The location and specific collecting dates are not given, but this tick also has been reported from Mississippi by Andrews et al. (1980).

Mississippi seasonal occurrence: Unknown.

Mississippi hosts: Rabbit.

Diagnostic characteristics of the species: Female auriculae as posteriorly directed protuberances. Male internal spur of Coxa I very long and thin.

Voucher specimens: Mississippi Entomological Museum, MSU (MEM #8-6).

Ixodes kingi
(The Rotund tick)

The Rotund tick is of no known economic importance except as a parasite of dogs and certain fur-bearing mammals.

Mississippi distribution: This species has been collected in Mississippi, but the date and locality are unknown (Bishopp and Trembley, 1945).

Mississippi seasonal occurrence: Unknown.

Mississippi hosts: Unknown.

Diagnostic characteristics of the species: Female palps thick and club-like; male and female with internal spur of Coxa I only moderately long not usually overlapping Coxa II.

Voucher specimens: None available.

Ixodes scapularis
(Black Legged tick)

The Black Legged tick commonly is encountered during the winter months in Mississippi. It parasitizes many species of mammals, especially deer, and occurs throughout the eastern and southeastern United States. This species is not known to be important transmitter of disease to man.

Mississippi distribution: Adams, Bolivar, Chickasaw, Choctaw, Copiah, Forrest, Franklin, George, Greene, Hancock, Harrison, Holmes, Jackson, Jasper, Jefferson, Jones, Marion, Noxubee, Oktibbeha, Pearl River, Perry, Scott, Stone, Wayne, Wilkinson, Tishomingo and Yazoo counties.

Mississippi seasonal occurrence: November through May.

Mississippi hosts: Deer, dog, horse, raccoon, rabbit and cattle.

Diagnostic characteristics of the species: Female palps longer than wide, auriculae reduced or inapparent; male with long, thin internal spur on Coxa I.

Voucher specimens: Rocky Mountain laboratories accession number 058672.

Ixodes texanus
(Raccoon tick)

The Raccoon tick is an important parasite of raccoons. It is distributed widely throughout the United States but was reported only recently from Mississippi (Goddard and Norment, 1983b). It is not known to transmit disease to humans.

Mississippi distribution: Marshall County.

Mississippi seasonal occurrence: March through August.

Mississippi hosts: Cottontail rabbit, raccoon and white-footed mouse.

Diagnostic characteristics of the species: Coxa I spurs on male and female reduced or absent; palps thick and club-like.

Voucher specimens: Rocky Mountain laboratories accession number 065923.

Rhipicephalus sanguineus
(Brown Dog tick)

The Brown Dog tick feeds almost exclusively on canines and is economically important because it occurs in extremely large numbers in and around homes with pet dogs. This species is irregularly distributed throughout the United States but is common in all sections of Mississippi. It does not bite man readily; however, it has potential for transmitting 11 diseases to man or animals (Miller, 1947).

Mississippi distribution: Coahoma, Forrest, Harrison, Hinds, Jackson, Jasper, Lafayette, Madison, Marshall, Oktibbeha, Prentiss and Tishomingo counties. Madison, Marshall, Prentiss and Tishomingo counties.

Mississippi seasonal occurrence: March through October.

Mississippi hosts: Dog.

Diagnostic characteristics of the species: Usually inornate, eyes and festoons present, coxa I deeply cleft. Spiracular plates comma shaped.

Voucher specimens: Mississippi Entomological Museum, MSU (Mem # 8-5).

Glossary of Terms Used IN The Key^a

Anterior:	Toward the front end.	Dimorphism:	Difference in form, color, etc., between individuals of the same species, more particularly between sexes.
Capitulum:	Anterior movable portion of body of hard ticks, including basis capituli, palps, hypostome and chelicerae of hard ticks. Located ventrally in adults and engorged nymphs of soft ticks, anteriorly in larvae.	Distal:	Farthest from the point of attachment or origin.
Chelicerae:	Paired structures lying dorsally to the hypostome, which complete the cylindrical mouth parts that are inserted when the tick feeds.	Dorsal:	Pertaining to the back or top of the body.
Chitinous tubercles:	Small, chitinized, rounded lobes on the posterointernal angle of the festoons of <i>Amblyomma cajennense</i> and sometimes <i>A. maculatum</i> .	Dorsum:	The upper surface of the body.
Cornua:	Small projections extending from the dorsal, posterolateral angles of the basis capituli.	Engorged:	Enlargement or distention of a tick following a blood meal. Since the scutum is short in the larva, nymph, and female hard tick (covering about half the dorsal surface in the unfed specimen), the body is capable of pronounced distention. As the body fills with blood, the relative size of the scutum is reduced. In a fully engorged female hard tick, the scutum may appear only as a small plate on the anterior of the body. In the soft tick, the scutum is absent and both sexes may become enlarged, although not usually to the extent of the engorged female hard tick.
Coxae: (sing. Coxa)	Small, sclerotized plates on the venter representing the first segment of the leg to which the trochanters are movably attached. From anterior to posterior, the coxae are designated by Roman numerals I, II, III and IV. Bifed coxae are those that are cleft, divided or forked.	Festoons:	Uniform rectangular areas, separated by distinct grooves, located on the posterior margin of most genera of the hard ticks. Very distinct areas in unengorged specimens but may not be visible in fully engorged females.
Denticles:	Small, recurved projections or "teeth" on the ventral side of the hypostome. (See dentition.)	Files:	Longitudinal rows of denticles or "teeth" on the ventral surface of the hypostome.
Dentition:	Refers to the presence of denticles on the ventral side of the hypostome. The numerical arrangement of the files or rows of denticles is expressed by the dentition formulas. Thus, dentition 3/3 means that there are three longitudinal rows of denticles on each side of the median line of the hypostome.	Genital aperture:	External opening of the genital organs. Located anteriorly on the ventro-median line, posterior to the basis capituli.
		Hypostome:	Median ventral structure of the mouth parts that lies parallel to

^aTaken in part from Strickland, et al., 1976, *Ticks of Veterinary Importance*. USDA Agricultural Handbook No. 485.

	and between the palps and are immovably attached to the basis capituli. It bears recurved "teeth" or denticles (See dentition.)		
Inornate:	Absence of a color pattern on the scutum.	Posterior:	Toward the rear end.
Integument:	Outer covering or cuticle of the tick's body.	Protuberance:	Any elevation above the surface.
Legs:	Segmented appendages of which nymphs and adults have four pair and larvae have three pair. From anterior to posterior, the legs are identified by Roman numerals I, II, III and IV. The segments from the proximal (next to the body) to the distal end are called coxa, trochanter, femur, tibia, metatarsus and tarsus.	Scutum:	The sclerotized dorsal plate posterior to the capitulum in hard ticks. It covers almost the entire dorsal surface in the male, about one half the dorsal surface in the unengorged female. (See engorged.)
Median:	Toward the median axis of the body.	Spiracular plates:	Paired plates located ventrolaterally and posterior to coxa IV in hard ticks; may be oval, rounded or comma-shaped. In the soft ticks the spiracular plates are located ventrolaterally and opposite coxa IV and are usually round or oval. They are the external evidence of the respiratory system.
Ornamentation:	Enamel-like color pattern that is superimposed on the base color of the integument in hard ticks. When present, this color pattern may be white to dirty white in <i>Dermacentor</i> or may be an intense copper or bronze color with touches of yellow or green in some <i>Amblyomma</i> .	Spurs:	Coxal spurs are projections from the posterior surface or posterior margin of the coxae; may be rounded or pointed, small or large. Projections on the median side are called internal spurs; those on the lateral side are called external spurs. Metatarsal spurs are small, pointed projections on the distal end of the metatarsus. Spurs also may be found on the palps of some species.
Media:	Toward the median axis of the body.	Tarsus:	The terminal leg segment.
Median:	The longitudinal axis that divides the body.		
Palps or palpi:	Paired articulated appendages located anterolaterally upon the basis capituli and lying parallel with the hypostome. Four distinct segments are present in soft ticks. In all hard ticks the fourth segment is reduced to a small hair-crowned papilla lying in a cuplike depression of segment 3. The sequence of numbering of the segments is indicated by Arabic numerals 1, 2, 3 and 4: 1 being the proximal segment (closest to the basis capituli).		

Acknowledgments

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