

Pictorial Key to the Adults of Hard Ticks, Family Ixodidae (Ixodida: Ixodoidea), East of the Mississippi River

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ABSTRACT Six genera and 27 species of hard ticks (Ixodidae) currently are recognized in the United States east of the Mississippi River as follows: *Amblyomma* (4 species), *Boophilus* (1), *Dermacentor* (3), *Haemaphysalis* (2), *Ixodes* (16), and *Rhipicephalus* (1). We present a diagrammatic couplet key to the adults of the six genera and 27 species of Ixodidae found in the eastern portion of the United States.

KEY WORDS Arachnida, pictorial key, Ixodidae, eastern United States

IN THE SUMMER of 1986, we were approached by members of the Armed Forces Pest Management Board and by military entomologists at Fort Meade, Md., and asked to prepare a pictorial key to ticks of the genus *Ixodes*. The key was to be used in conjunction with a survey of ticks as potential vectors of Lyme disease. We prepared an *Ixodes* key, and because there were only 11 additional species of hard ticks east of the Mississippi, we expanded the key to include all Ixodidae found in that region.

When using a pictorial key such as the one presented here, it should be remembered that the illustrations are based on essentially perfect specimens; i.e., all structures are intact. Anyone who has collected ticks knows that this is the exception rather than the rule. It is often necessary to tease host tissue away from the hypostome in order to count dentition, assuming that the hypostome is present at all. Specimens that are field-collected often are bloated with blood, missing palps and legs, and covered with dirt. Therefore, in addition to using this pictorial key, we recommend the following reference keys to double-check preliminary identifications: *Amblyomma* (Cooley & Kohls 1944, Jones et al. 1972), *Boophilus*, *Haemaphysalis*, and *Rhipicephalus* (Cooley 1946); *Dermacentor* (Cooley 1938, Yunker et al. 1986); and *Ixodes* (Cooley & Kohls 1945, Keirans & Clifford 1978).

Following the pictorial key, we provide in table form a brief summary of the hosts and distribution of hard ticks east of the Mississippi.

References Cited

- Bishopp, F. C. & H. L. Trembley. 1945. Distribution and hosts of certain North American ticks. J. Parasitol. 31: 1-54.
- Cooley, R. A. 1938. The genera *Dermacentor* and *Otocentor* (Ixodidae) in the United States, with studies in variation. National Institutes of Health Bulletin 171.
1946. The genera *Boophilus*, *Rhipicephalus*, and *Haemaphysalis* (Ixodidae) of the New World. National Institutes of Health Bulletin 187.
- Cooley, R. A. & G. M. Kohls. 1944. The genus *Amblyomma* (Ixodidae) in the United States. J. Parasitol. 30: 77-111.
1945. The genus *Ixodes* in North America. National Institutes of Health Bulletin 184.
- Jones, E. K., C. M. Clifford, J. E. Keirans & G. M. Kohls. 1972. The ticks of Venezuela (Acarina: Ixodoidea) with a key to the species of *Amblyomma* in the Western Hemisphere. Brigham Young Univ. Sci. Bull. Biol. Ser. 17: 1-40.
- Keirans, J. E. & C. M. Clifford. 1978. The genus *Ixodes* in the United States: a scanning electron microscope study and key to the adults. J. Med. Entomol. Suppl. 2.
- Yunker, C. E., J. E. Keirans, C. M. Clifford & E. R. Easton. 1986. *Dermacentor* ticks (Acari: Ixodoidea) of the New World: A scanning electron microscope atlas. Proc. Entomol. Soc. Wash. 88: 609-627.

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The views of the authors do not purport to reflect the positions of the Department of the Army or the Department of Defense.

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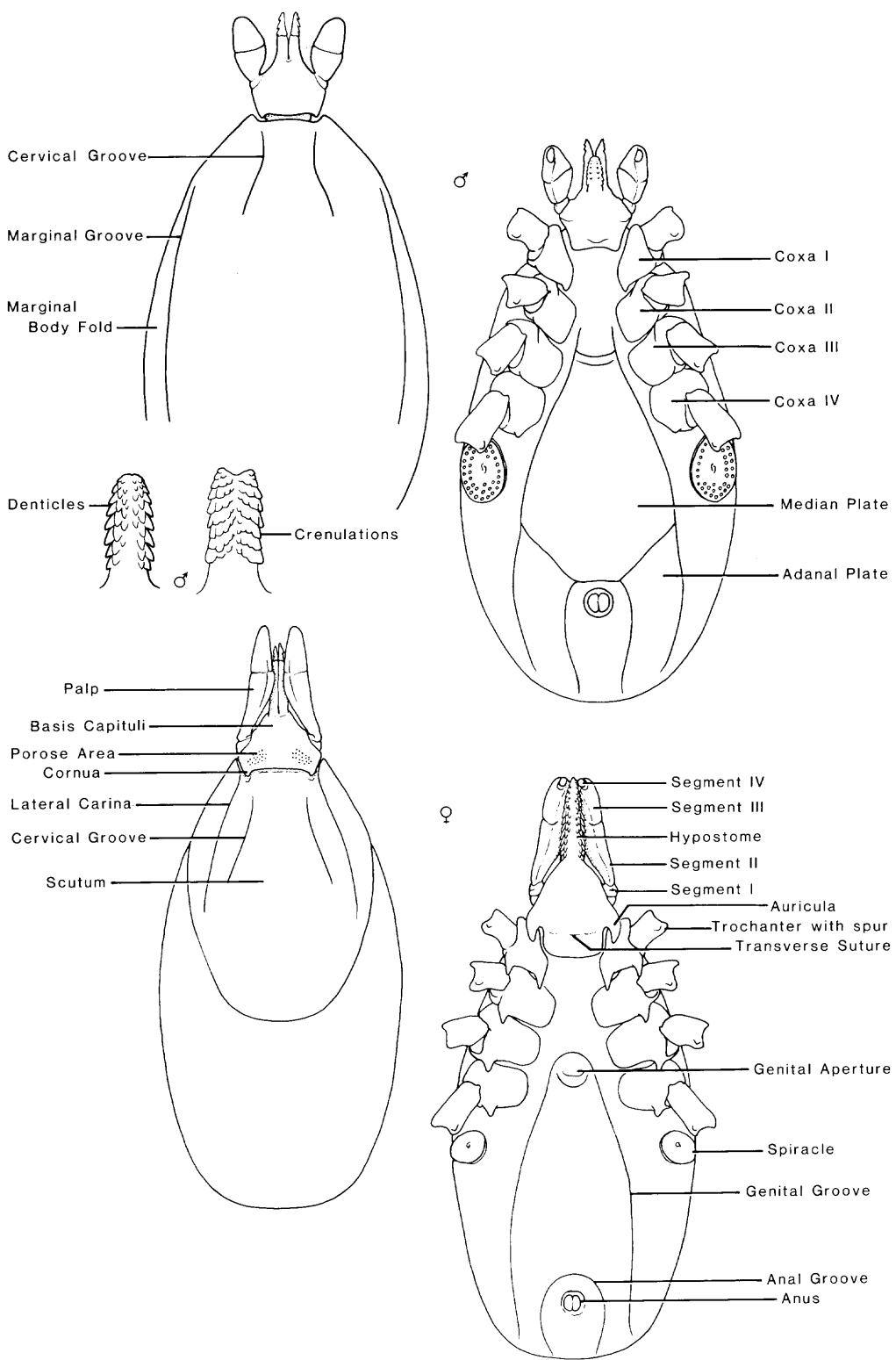
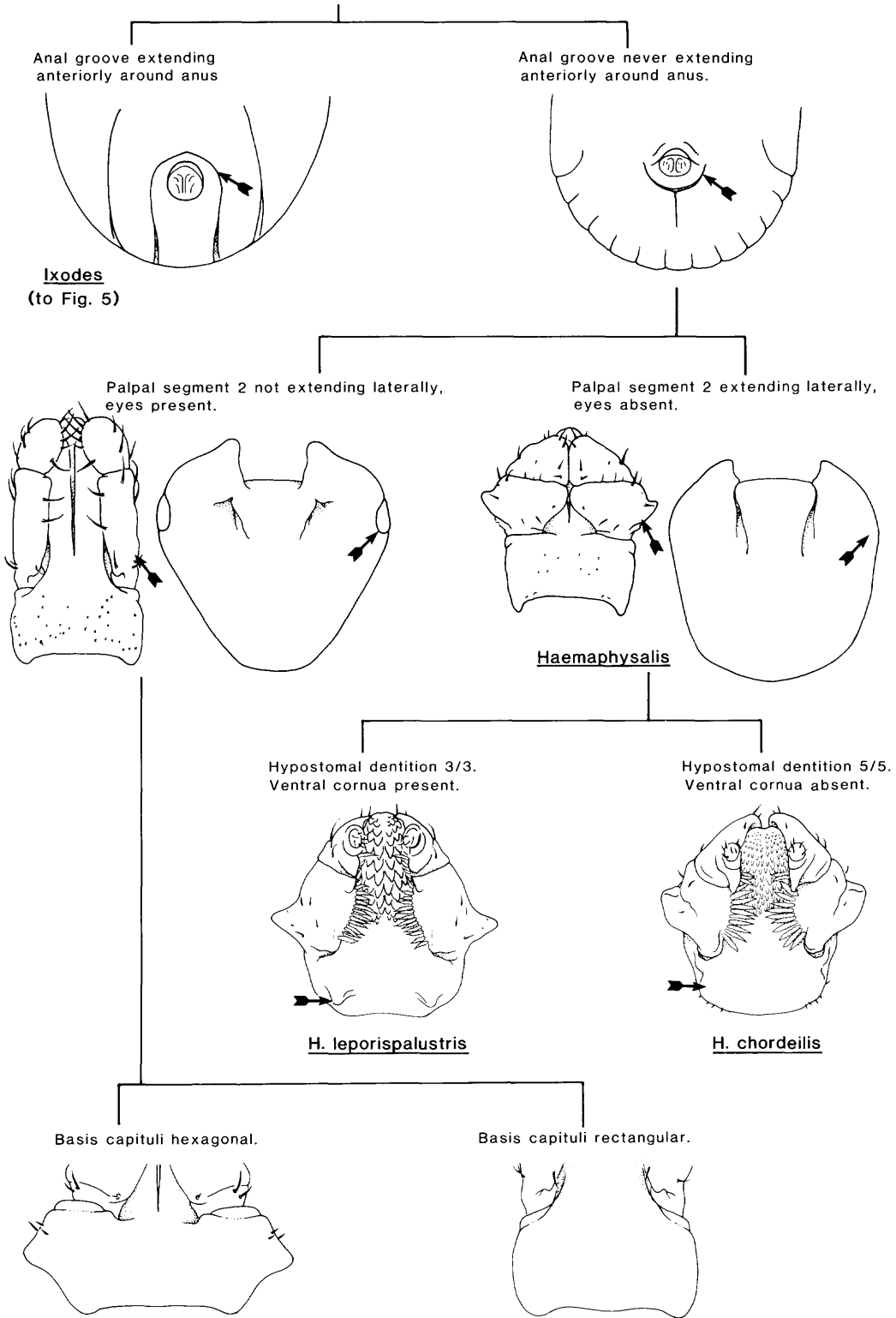


Fig. 1. Diagnostic characters of hard ticks, genus *Ixodes* (from Keirans & Clifford 1978).

Fig. 2. Pictorial Key to the Adult Hard Ticks (Ixodidae)
of the U.S.A. East of the Mississippi



(to Fig. 3)

Fig. 3.

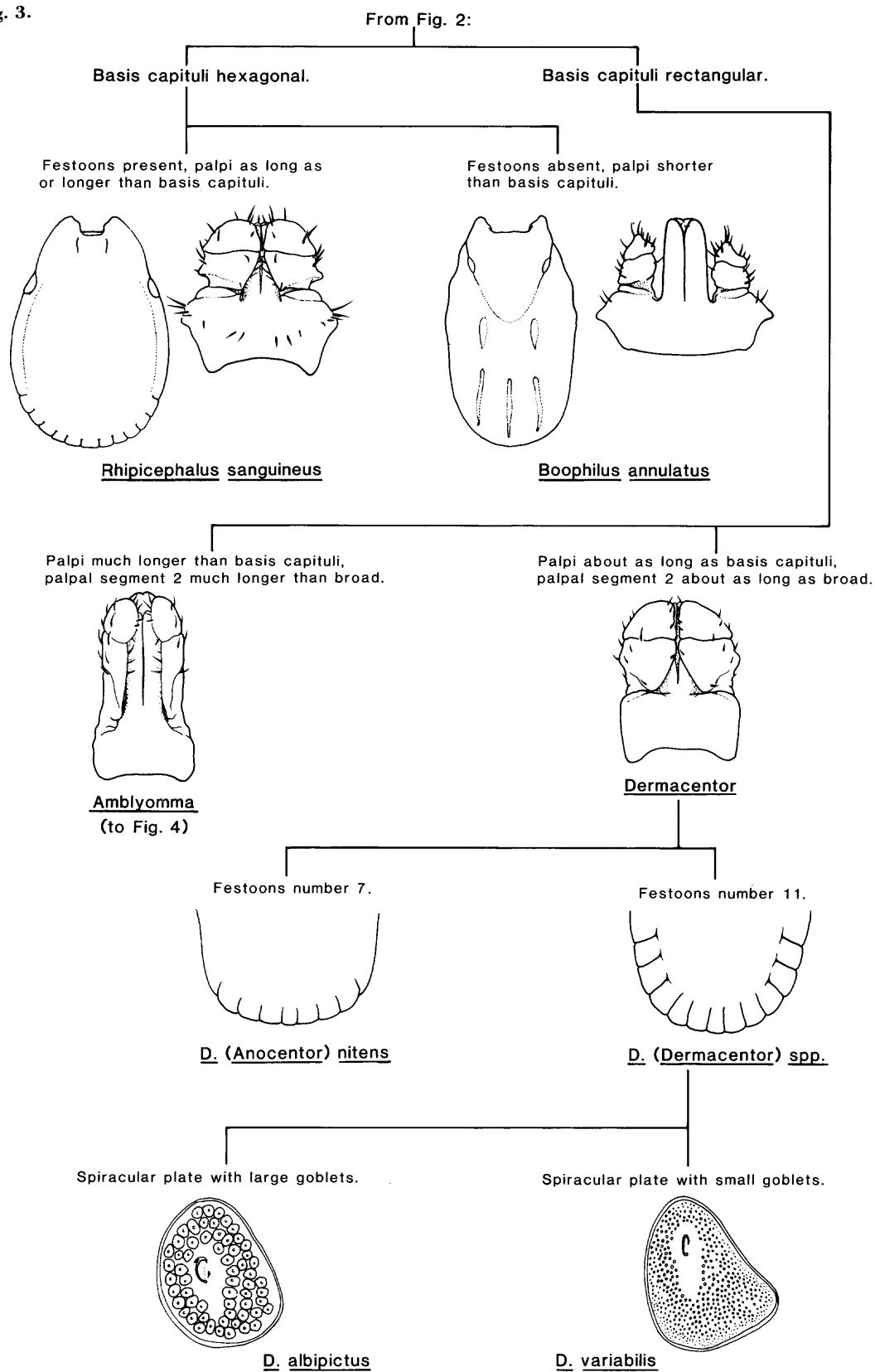


Fig. 4.

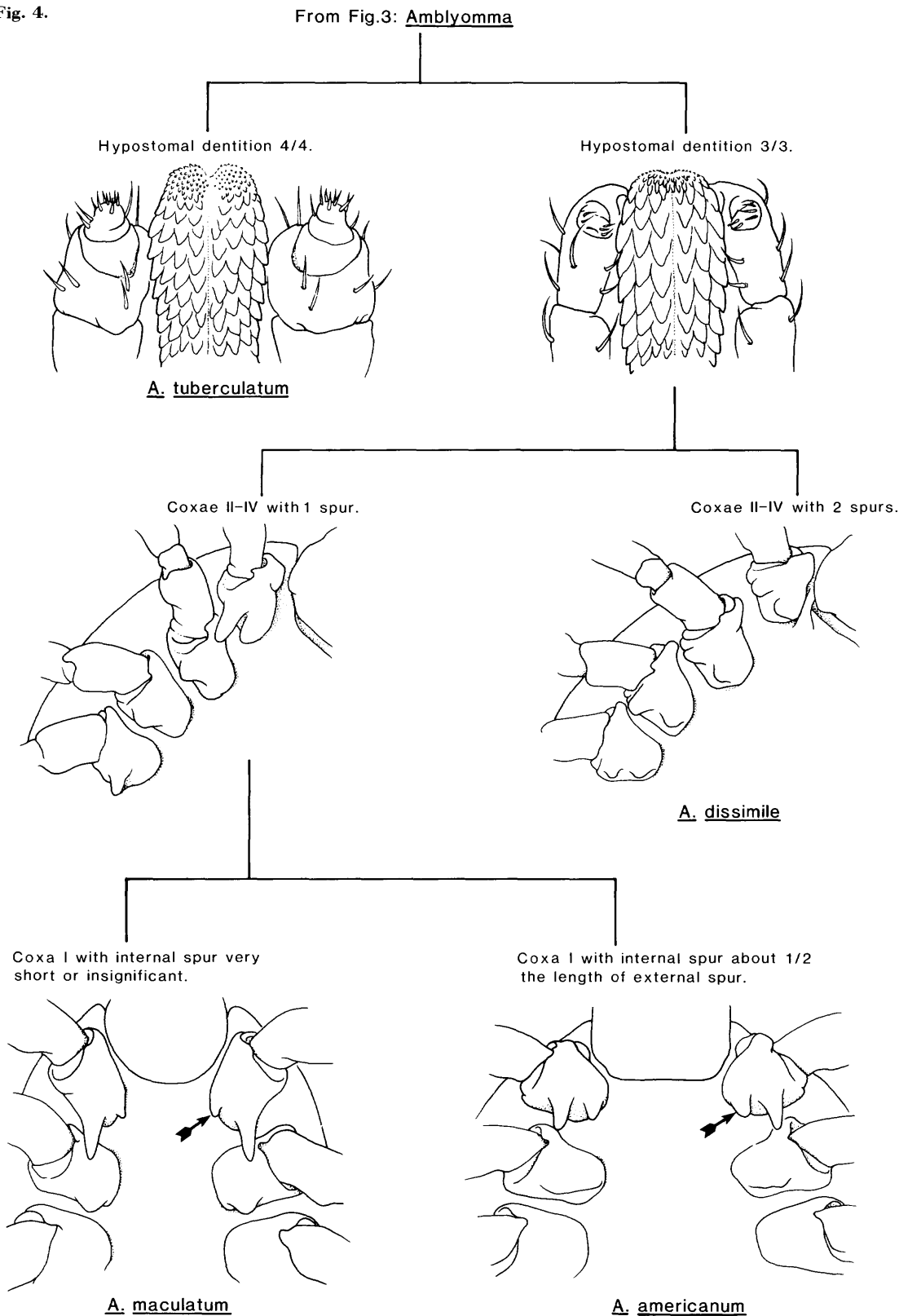


Fig. 5.

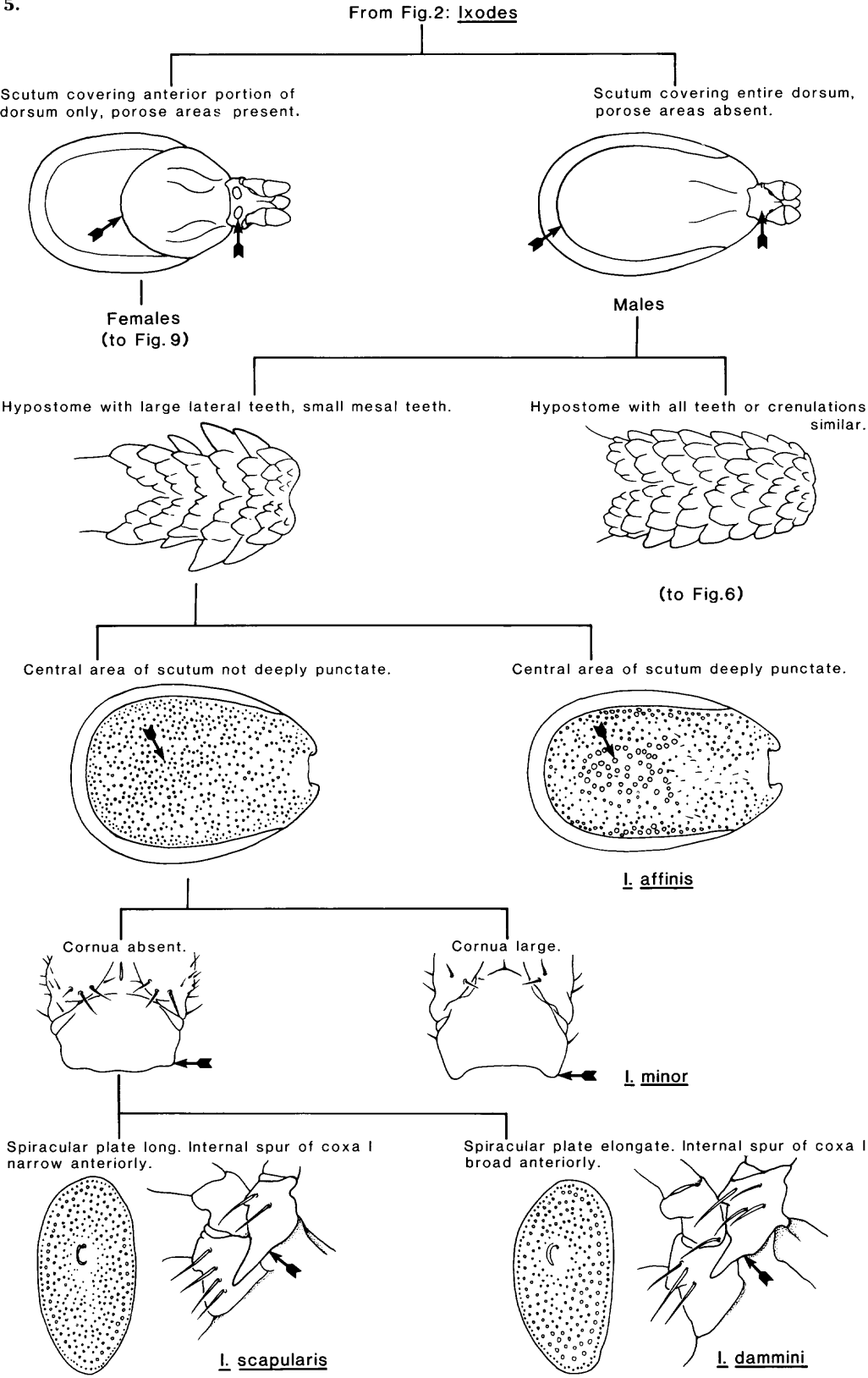


Fig. 6.

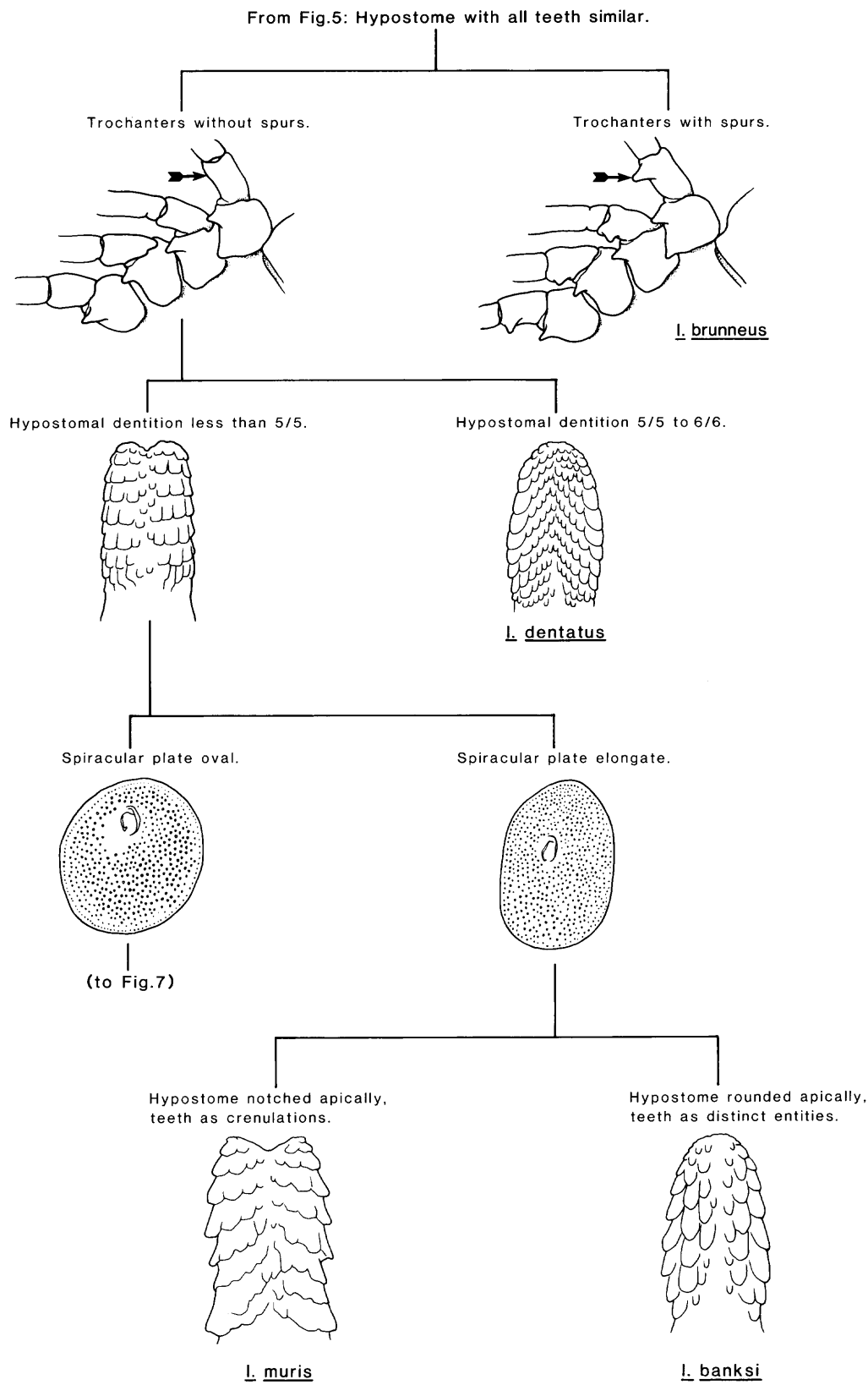


Fig. 7.

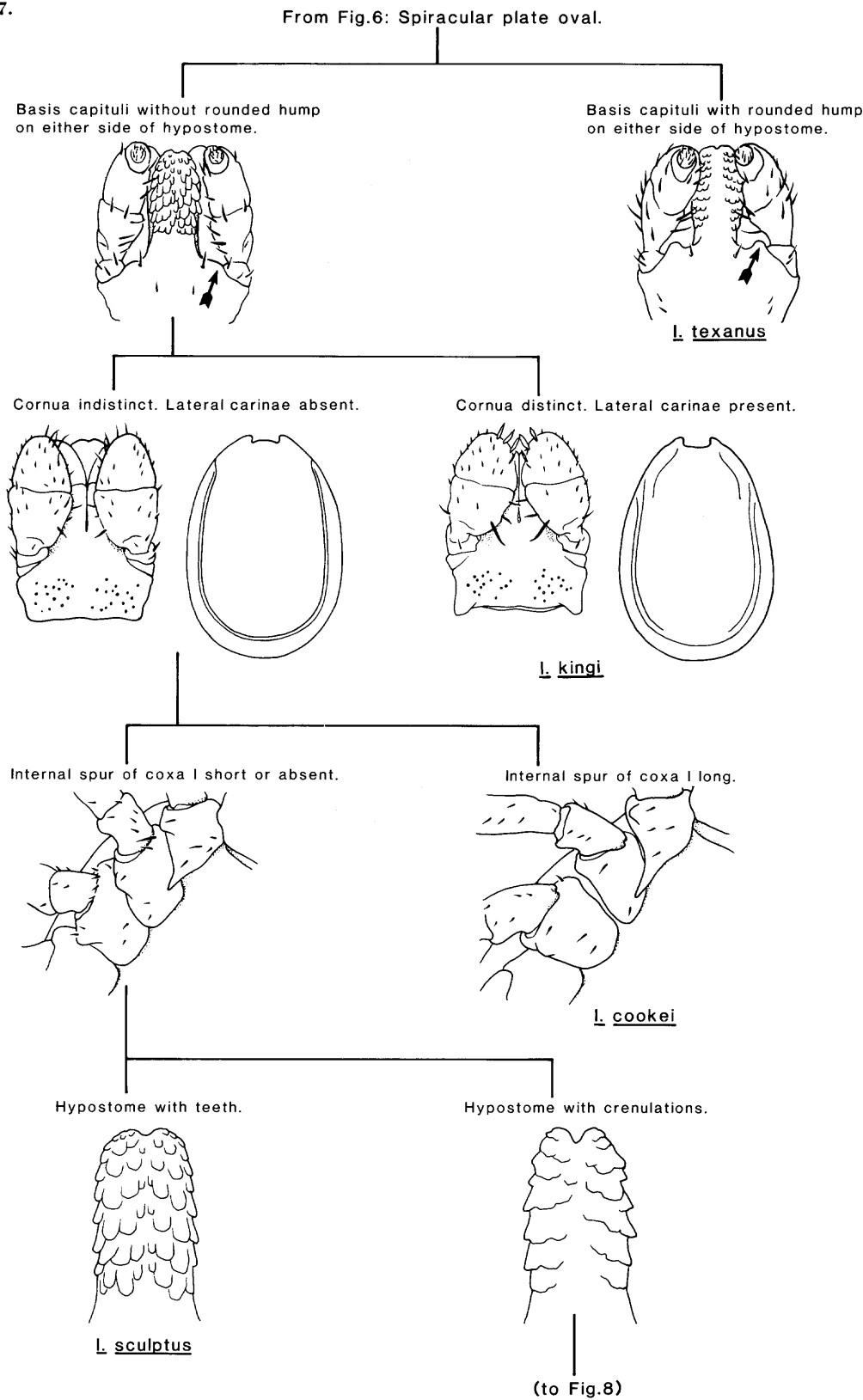


Fig. 8.

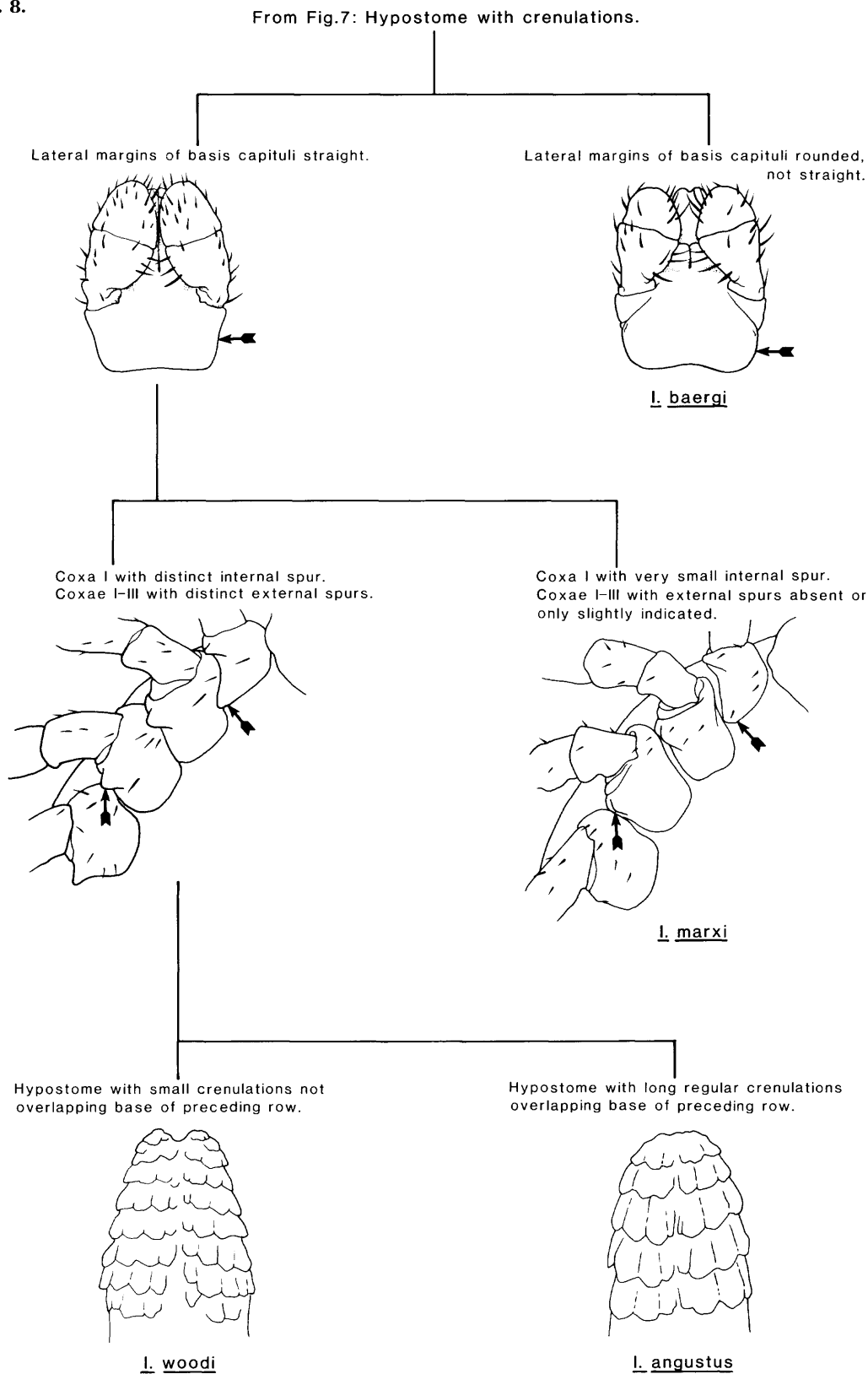


Fig. 9.

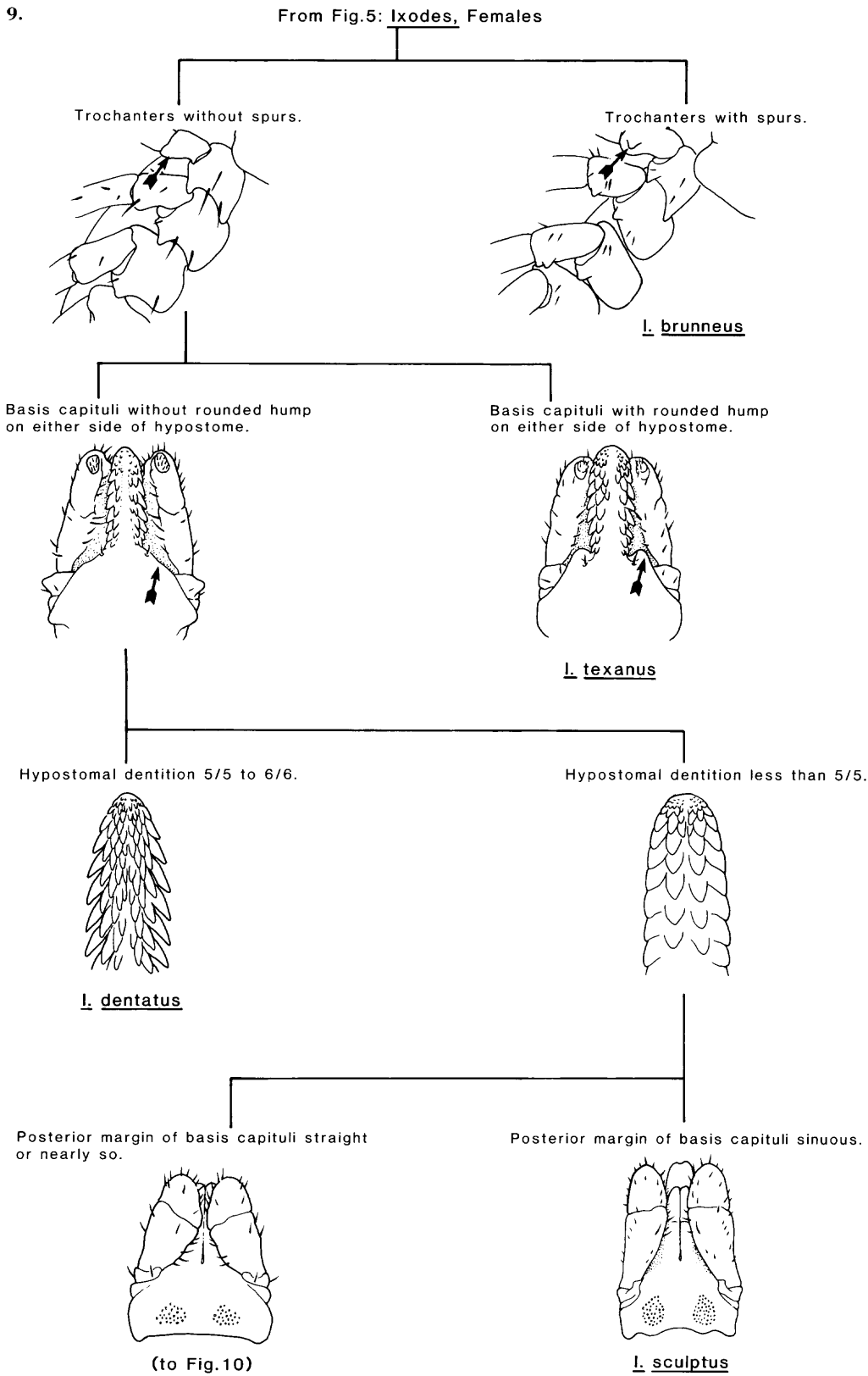


Fig. 10. From Fig.9: Posterior margin of basis capituli straight or nearly so.

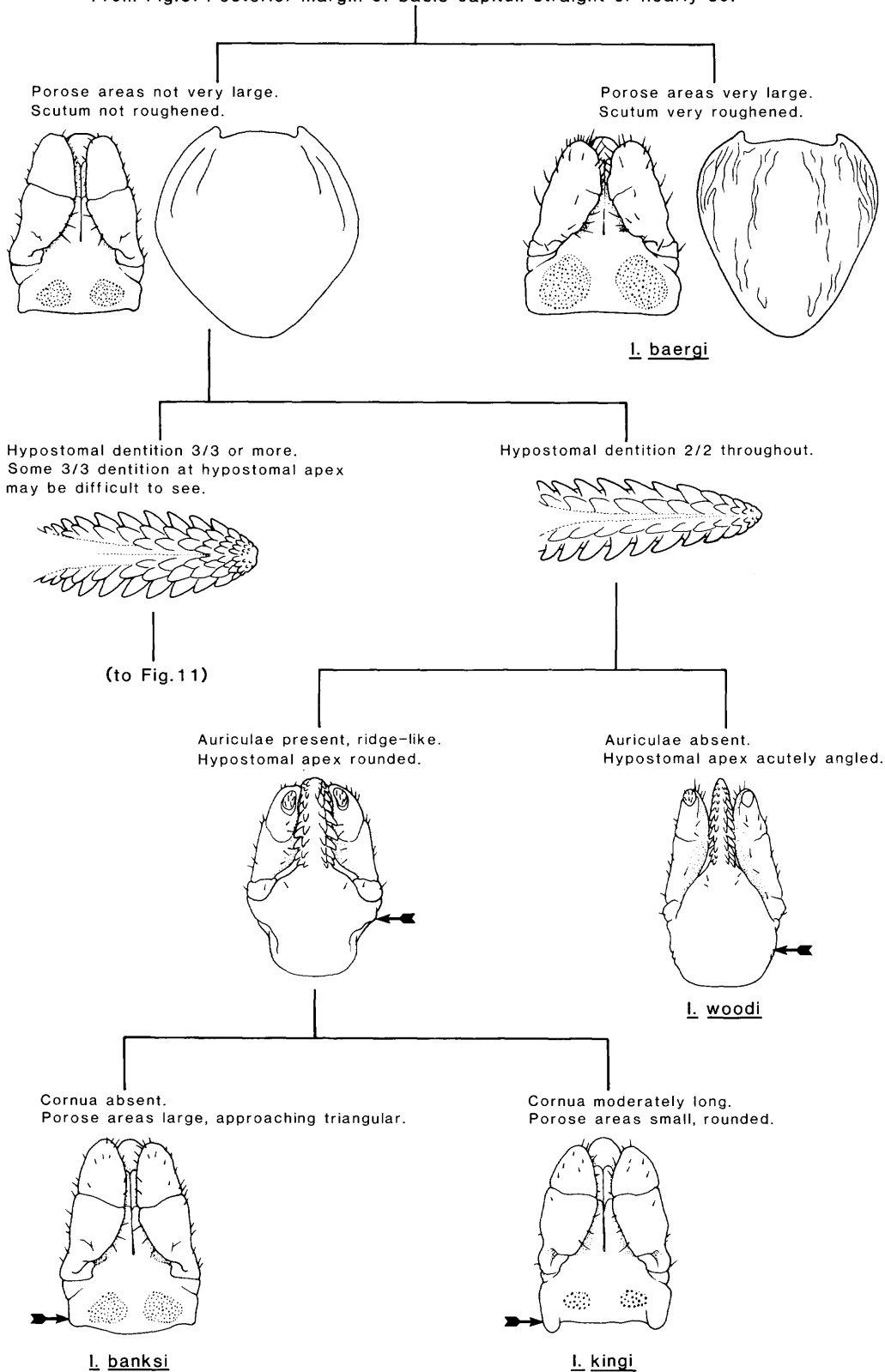
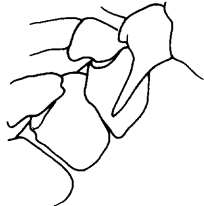
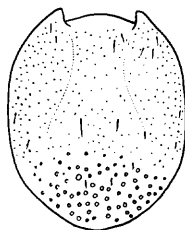


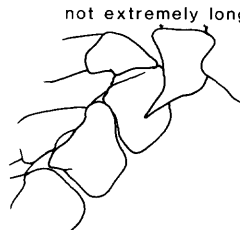
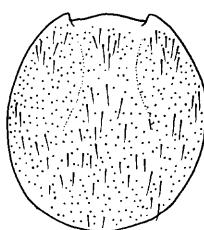
Fig. 11.

From Fig. 10: Hypostomal dentition 3/3 or more.

Posterior scutal area with large punctations.
Internal spur of coxa I extremely long.

I. affinis

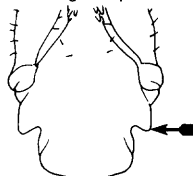
Posterior scutal area without large punctations.
Internal spur of coxa I long or short but
not extremely long.



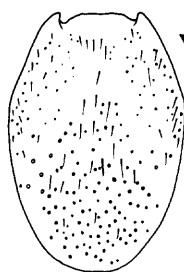
Auriculae lobe-like, ridge-like or absent.



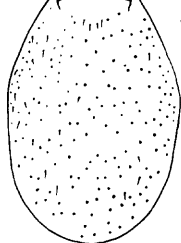
Auriculae elongate posterior extensions.



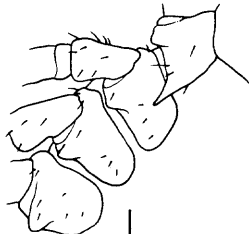
Scutum with deep punctations.
Palpal segment I with sharp
triangular plate ventrally.

I. minor

Scutum smooth, relatively impunctate.
Palpal segment I with rounded
plate ventrally.

I. muris

Obvious internal spur on coxa I.
External spurs present on all coxae.



(to Fig. 12)

Spurs absent on all coxae (internal spur
may be indicated on coxa I).

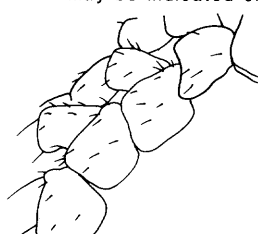
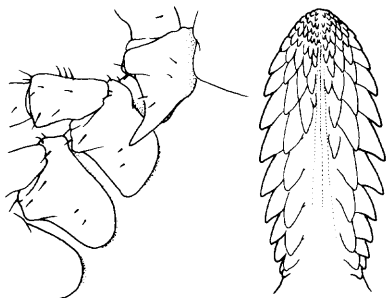
I. marxi

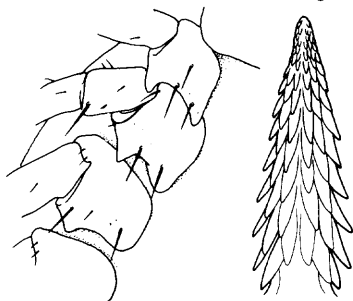
Fig. 12.

From Fig. 11: Obvious internal spur on coxa I.
External spurs present on all coxae.

Internal spur of coxa I longer than external.
Hypostome broad, not 3/3 throughout length.

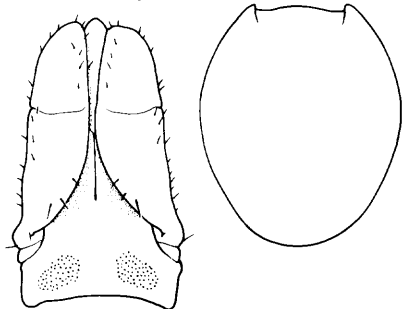


Spurs of coxa I equal in size.
Hypostome long, narrow, 3/3 throughout length,
with teeth flaring laterally.

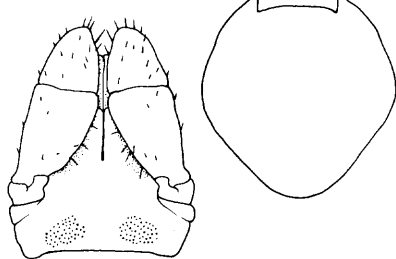


I. angustus

Palps long. Hypostome 4/4 apically.
Scutum broadly rounded.

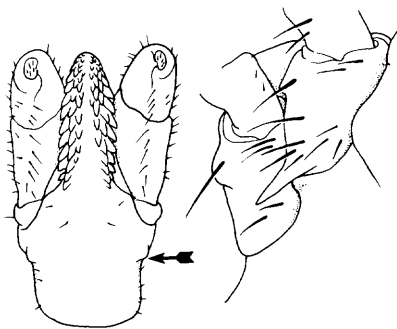


Palps short. Hypostome 3/3 apically.
Scutum angular.



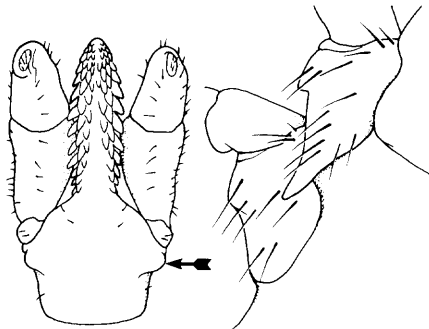
I. cookei

Auriculae not prominent ledges,
not extending exterior to basis.
Internal spur of coxa I anteriorly narrow.



I. scapularis

Auriculae prominent ledges
extending exterior to basis.
Internal spur of coxa I anteriorly broad.



I. dammini

Table 1. Adult Ixodidae: common hosts and distribution east of the Mississippi River

Tick	Distribution
<i>Amblyomma americanum</i> (Linnaeus)	Cattle, dogs, deer, humans; southeast, northward into New Jersey, Long Island, New York, Rhode Island.
<i>A. dissimile</i> Koch	Reptiles, especially snakes; Florida.
<i>A. maculatum</i> Koch	Large domestic and wild mammals; primarily Gulf Coast states. Northern records are from nymphs on birds.
<i>A. tuberculatum</i> Marx	<i>Gopherus polyphemus</i> ; coastal areas of Alabama, Florida, Georgia, Mississippi, South Carolina.
<i>Boophilus annulatus</i> (Say)	Cattle; no <i>Boophilus</i> species are now present east of the Mississippi but introductions may occur, and <i>B. annulatus</i> was formerly resident in the Southeast.
<i>Dermacentor albipictus</i> (Packard)	Ruminants, equids; irregular in most areas east of the Mississippi, more common in the north.
<i>D. nitens</i> Neumann	Equids, ruminants; southern Florida.
<i>D. variabilis</i> (Say)	Cattle, dogs, raccoons, humans; all areas east of the Mississippi.
<i>Haemaphysalis chordeilis</i> (Packard)	Ground-nesting and ground-frequenting birds, rarely mammals; irregularly distributed.
<i>H. leporispalustris</i> (Packard)	Lagomorphs; found in all areas east of the Mississippi.
<i>Ixodes affinis</i> Neumann	Deer, dogs, raccoons; Florida, Georgia, South Carolina.
<i>I. angustus</i> Neumann	Cricetidae; cooler, wetter areas of Indiana, Maine, Michigan, Minnesota, New Hampshire, New York, North Carolina, Pennsylvania, Rhode Island, Tennessee, Virginia, West Virginia, Wisconsin.
<i>I. baergi</i> Cooley & Kohls	Cliff swallows; Arkansas, Illinois.
<i>I. banksi</i> Bishopp	Beavers, muskrats; Alabama, Arkansas, Connecticut, Michigan, Missouri, Wisconsin.
<i>I. brunneus</i> Koch	Birds; widely and irregularly distributed.
<i>I. cookei</i> Packard	Usually carnivores and woodchucks, occasionally humans; all areas east of the Mississippi.
<i>I. dammini</i> Spielman, Clifford, Piesman & Corwin	Deer, fox, dogs, humans; Wisconsin and Minnesota, eastward into New England, south to Virginia.
<i>I. dentatus</i> Marx	Lagomorphs; all areas east of the Mississippi.
<i>I. kingi</i> Bishopp	Carnivores, spermophils; reported east of the Mississippi (Bishopp & Trembley 1945), but if present, rare.
<i>I. marxi</i> Banks	Primarily squirrels; most areas east of the Mississippi.
<i>I. minor</i> Neumann	Rats and mice; Florida, Georgia.
<i>I. muris</i> Bishopp & Smith	Mice; Minnesota and Michigan eastward to Massachusetts, and southward to South Carolina.
<i>I. scapularis</i> Say	Large mammals including cattle, dogs, humans; southern states.
<i>I. sculptus</i> Neumann	Usually squirrels and their predators; Illinois, Indiana, Minnesota, Wisconsin.
<i>I. texanus</i> Banks	Primarily raccoons; from the Gulf Coast states northward to New York.
<i>I. woodi</i> Bishopp	Primarily woodrats; Alabama, Indiana.
<i>Rhipicephalus sanguineus</i> (Latreille)	Dogs; all areas east of the Mississippi.