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DERMACENTOR (INDOCENTOR) TAIWANENSIS (ACARI: IXODOIDEA:
IXODIDAE): IDENTITY OF MALE AND FEMALE

BY

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DERMACENTOR (INDOCENTOR) TAIWANENSIS (ACARI: IXODOIDEA: IXODIDAE): IDENTITY OF MALE AND FEMALE^{1,2}

Hilda Y. Wassef and Harry Hoogstraal³

Abstract. *Dermacentor (Indocentor) taiwanensis* of Taiwan and southern islands of Japan, where it parasitizes chiefly the Wild Pig, is redescribed and illustrated from study of 230 adult specimens and comparative study of more than 18,000 specimens constituting the Oriental subgenus *Indocentor*. This distinctive species is easily recognized by the short, closely spaced coxa I spurs that are joined anteriorly in each sex; 3-5 spurs on male coxa IV; female external genitalia moderately large, broadly V-shaped, blunt apically; and characteristic scutal ornamentation pattern of each sex.

As a step in revising the Oriental subgenus *Indocentor* Schulze of the genus *Dermacentor* Koch (Wassef & Hoogstraal 1983, 1984a,b; Hoogstraal & Wassef 1984, 1985a,b; Hoogstraal et al. 1986), we redescribe and illustrate the male and female of *D. (I.) taiwanensis* Sugimoto from 220 adult specimens from Taiwan and 10 adult specimens from southern Japan. Host and distribution data for adults and immatures are reported separately (Hoogstraal et al. 1986). The larva and nymph of this taxon were described and illustrated by Kitaoka & Suzuki (1981). *Dermacentor (I.) taiwanensis* is the only *Indocentor* species represented in our numerous collections of ticks from Taiwan wildlife and livestock and is the only species of the genus *Dermacentor* recorded from the Taiwan Wild Pig, *Sus scrofa taiwanus* Swinhoe.

***Dermacentor (Indocentor) taiwanensis* Sugimoto**
FIG. 1-16

Taiwan-Japanese pig *Dermacentor*

Notes and synonymy

Dermacentor taiwanensis. Sugimoto (1935: 1-7, fig. 6-10) described 1♂ collected on Wild Pig at Aoshan, Hsintien, Taipei Prefecture, Taiwan (Formosa) (Nishiyama legit).

Dermacentor taiwanensis. Sugimoto (1936: 41-42, pl. V, fig. 1-

5; pl. VIII, fig. 5, 6) redescribed ♂ and described ♀ from *Sus taiwanus* at Shiten, Taipei; stated that, except for a few differences, *D. taiwanensis* resembles *D. atrosignatus* Neumann, 1906. Sugimoto (1937: 325-27, pl. IV, fig. 1-8) redescribed ♂ and ♀ from *Sus taiwanus* in the Formosan Mountain Reservation for Aborigines. Note. Maa & Kuo (1966: 382-83) listed several review papers published by Sugimoto between 1936 and 1942 in which *D. taiwanensis* was mentioned without new data.

Dermacentor taiwanensis Sugimoto. Toumanoff (1944: 94) briefly compared *D. taiwanensis* and *D. auratus* Supino, 1897.

Dermacentor taiwanensis Sugimoto. Luh & Woo (1950: 204) listed this species as occurring in Taiwan.

Dermacentor sp. Keegan & Toshioka (1957: 10-11, pl. 14) illustrated a ♂ *Dermacentor* from *Sus* sp. in Kyoto, Japan, that is typical of *D. taiwanensis*.

Dermacentor taiwanensis Sugimoto. Arthur (1960: 166-69, fig. 360-69) copied illustrations from Sugimoto (1937) and summarized ♂ and ♀ characters.

Dermacentor taiwanensis Sugimoto. Maa & Kuo (1966: 382-83) reviewed Sugimoto literature, as mentioned in paragraph 2 of these notes.

Dermacentor sp. Yamaguti et al. (1971: 36-42, pl. 28) copied Keegan & Toshioka (1957) illustration.

Dermacentor taiwanensis Sugimoto. Teng (1978: 124-26, fig. 541-50) briefly redescribed ♂ and ♀ and copied illustrations from Sugimoto (1936); stated that he had not seen specimens but considered this taxon probably to be a junior synonym of *D. auratus* Supino.

Dermacentor taiwanensis Sugimoto. Kitaoka & Suzuki (1981: 205-11, fig. 1-9) described and illustrated the nymph and larva collected from small and medium-sized mammals in southern Honshu, Kyushu, and Nansei islands of Japan.

Redescription

Note. The 230 adults examined for this study are listed by Hoogstraal et al. (1986).

♂ (Fig. 1-6). *Length* from palpal apices to scutal posterior margin 4.73 to 6.84 (avg. of 20 specimens measured 5.73) mm, *breadth* 3.24 to 4.86 (avg. 3.79) mm. *Color*. Ivory enamelling covering all of pseudoscutum (except for narrow cervical grooves) and most of posterior area of scutum. Brownish areas as follows: a large angular area from eye to scutal midlength adjacent to lateral groove extending continuously or discontinuously to lateral margin; a smaller irregular area immediately posterior to scutal midlength close to (but not reaching) lateral groove; 5 central slightly elevated areas (a paired narrow submedian line between posterior margin of pseudoscutum and scutal midlength, a long narrow posteromedian line, and 2 narrow paramedian areas); festoons 3, 4, 8, and 9 partially or entirely brownish. (Color intensity variable in preserved specimens but usually bright when specimens are wet.)

Capitulum (Fig. 3, 4, 5). *Basis capituli* dorsally enamelled; ca. 1.7× as broad as long (including cornua); central setae minute (number 2-3 inconspicuous pairs); external margins slightly curving; cornua short, broadly triangular, apices blunt; basis capituli ventrally as illustrated, setae number 1-3 posteroex-

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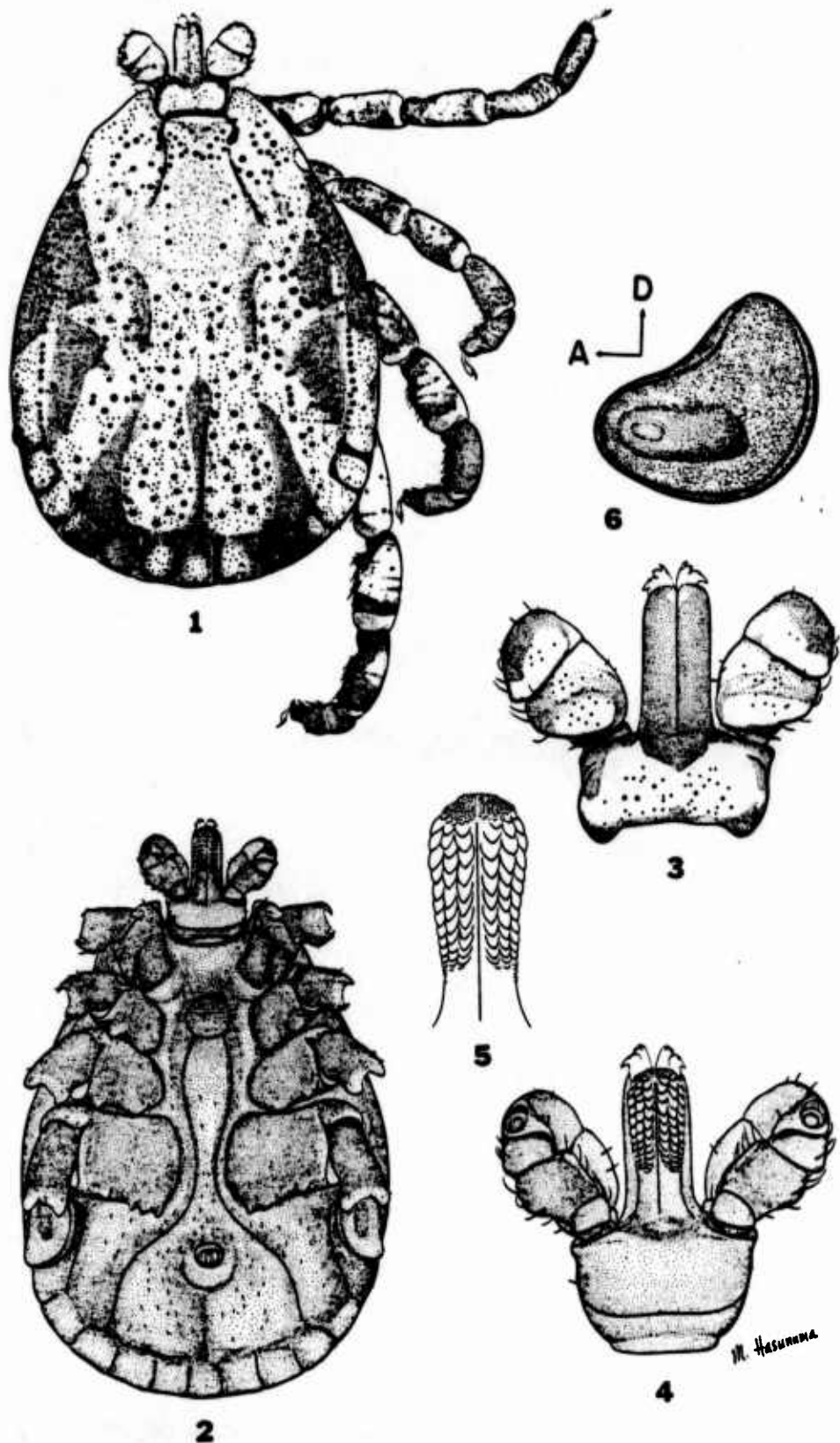


FIG. 1-6. *Dermacentor (Indocentor) taiwanensis* ♂ Taiwan: 1, dorsal view; 2, ventral view; 3, capitulum dorsal view; 4, capitulum ventral view; 5, hypostome; 6, spiracular plate (A = anterior, D = dorsal).

ternal pairs. *Palpi*. Segment 1 as a short, narrow pedicle, setae number 2-3 dorsally, 1 short ventrally, 3 ventrointernally. Segment 2 ca. $1.1\times$ as broad as long, setae number 5 dorsally, 5 ventrally, 3 laterally; dorsointernal and ventrointernal setae number 2 and 4, respectively. Segment 3 ca. $0.7\times$ as long as 2; setae number 6 dorsally, 2 laterally, 3 ventrally, 2 ventrointernally, 2 ventroanteriorly. *Hypostome* (Fig. 5) ca. $2\times$ as long as broad; apex bluntly rounded, corona ca. $\frac{1}{2}$ as long as denticle files, dental formula 3/3, denticles in files of 10-11, small crenulations in a few rows posteriorly.

Scutum (Fig. 1) broadly oval, ca. $1.3\times$ as long as broad. Length 4.16 to 5.98 (avg. 4.91) mm (for ornamentation, see Color, preceding). Anterior emargination deep, broad; scapulae broad; margins gradually diverging to level of coxa IV, thence converging to broadly rounded posterior margin; spiracular plate projection (minute) visible dorsally. *Pseudoscutum* broader than long, marked posteriorly by a faint brownish line; not always distinctly delineated from rest of scutum. *Eyes* flat, oval, pale; rarely bordered by 1-2 minute punctations. *Cervical pits* short, dark, curving, deep. *Cervical grooves* superficial, marked by brown lines extending to posterior $\frac{1}{4}$ of pseudoscutal length. *Lateral grooves* each represented by a row of contiguous or noncontiguous, deep, large and medium-sized punctations extending to or beyond scutal midlength. *Punctuation* numbers moderate to numerous posteriorly, fewer and smaller anteriorly, irregularly scattered in enamelled areas, few present in brown areas. *Festoons* number 11.

Venter (Fig. 2, 6). *Integument* (Fig. 2) smooth, setae small. *Genital area* (Fig. 2) as illustrated. *Spiracular plates* (Fig. 6) bluntly oval; dorsal projections bluntly rounded apically; goblets minute, numerous. *Legs* (Fig. 1, 2) large, robust, ivory enamelled dorsally. *Coxa I* (Fig. 2) spurs short, closely spaced, joined anteriorly, length subequal, external spur narrower than broadly triangular internal spur. *Coxae II* and *III* spurs each number 2, widely separated, small, external spur triangular, internal spur broader, less pointed. *Coxa IV* (Fig. 2) greatly enlarged ca. $1.5\times$ as broad as long, internal margin generally straight or slightly curving; spurs number 3-5, size and outlines variable, those between internal and external spurs more or less closely spaced. *Trochanter I* dorsal shield (Fig. 1) enamelled, broadly triangular; trochanter II-IV ventral spurs weak or obsolete. *Tarsi* (Fig. 1) stout, II-IV dorsal surfaces abruptly tapering distally; each with 2 stout ventral spurs and a strong ventroapical hook. *Claws* large, subequal. *Pulvilli* short, reaching only to midlength of claws.

♀ (Fig. 7-15). Differs from ♂ chiefly in sexual characters. Length 4.90 to 6.56 (avg. of 20 unfed specimens 6.08) mm; breadth 3.02 to 4.28 (avg. 3.91) mm.

Capitulum (Fig. 9-11). *Basis capituli* dorsal outline and cornua similar to those of ♂, porose areas oval or subcircular, size moderate, deep, widely spaced. *Basis capituli* dorsally ca. $2.4\times$ as broad as long, ventrally as illustrated. *Palpi* similar to those of ♂ but larger; setae numbers differing from those of ♂ as follows: segment 1 ventrointernal setae number 3-4; segment 2 setae number 5-6 dorsally, 4 ventrally, 2 laterally; segment 3 setae number 5 dorsally, 3 ventrally, 2 laterally, 2 ventrointernally. *Hypostome* (Fig. 11) essentially as in ♂, corona ca. $\frac{1}{2}$ as long as denticle files.

Scutum (Fig. 7) 2.05 to 2.68 (avg. 2.48) mm long; 2.17 to 2.91 (avg. 2.71) mm broad, ca. $0.9\times$ as broad as long. Anterior emargination deep, broad; scapulae blunt; margins gradually diverging to level of eyes, thence gradually converging, posteriorly broadly rounded. *Eyes* flat, oval, rarely bordered by 1-2 punctations. *Color* mostly ivory enamel much as in ♂; narrow, faint brownish area bordering eyes extending a slight distance anteriorly and posteriorly along scutal margin; irregular brown-

ish median line interrupted or mostly absent (except posteriorly); a pair of irregular brownish areas along posterolateral margins. *Cervical pits* as in ♂. *Cervical grooves* superficial, brownish. *Punctations* moderately numerous; irregularly scattered in enamelled areas, size large to moderate medianly, small in scapular and posterior areas.

Dorsum (Fig. 7) punctuation numbers moderate, few on lateral grooves and festoons; irregularly scattered, size medium, each usually with a single short white seta (sometimes indistinct). *Color* light brown, festoons partly yellowish (color indistinct in fed and dry specimens). *Venter* (Fig. 8) as illustrated. *Genital operculum* (Fig. 12, 16) size moderate, broadly V-shaped, apex blunt. *Spiracular plates* (Fig. 13) as illustrated. *Legs* (Fig. 7, 8, 14, 15). *Coxae I-III* (Fig. 8, 16) shape and spurs similar to those of ♂. *Coxa IV* not greatly enlarged, spurs number 2, internal spur usually narrower than external spur. *Trochanter I* dorsal shield (Fig. 7) and trochanters ventrally (Fig. 8) as in ♂. *Claws* and *pulvilli* as in ♂.

Nymph and larva. These stages were described by Kitaoka & Suzuki (1981).

Diagnosis (adults)

A moderately large *Dermacentor* (subgenus *Indocentor*) [total length (mm): ♂ avg. 5.73 (4.73 to 6.84); ♀ avg. 6.08 (4.90 to 6.56)]. *Basis capituli* cornua short; porose areas (♀) size moderate, widely spaced. *Scutum* (♂) ca. $1.3\times$ as long as broad. *Lateral grooves* each a line of contiguous or noncontiguous, deep, large and medium-sized punctations extending to or beyond scutal midlength. *Pseudoscutum* broader than long (not always distinctly delineated from rest of scutum). *Color* (♂). Ivory enamelling covering most of scutum; absent in narrow cervical grooves, a large angular area from eye to scutal midlength adjacent to lateral groove and extending to lateral margin, an irregular area immediately posterior to scutal midlength close to lateral grooves, 5 central slightly elevated areas (a paired narrow submedian line between posterior margin of pseudoscutum and scutal midlength, a long narrow posteromedian line, and 2 narrow paramedian areas); festoons 3, 4, 8, and 9 partially or entirely brownish. *Scutum* (♀) ca. $0.9\times$ as broad as long; mostly ivory enamelled; faint brownish area bordering eyes narrow, extending a slight distance anteriorly and posteriorly along scutal margin; brownish median line irregular, interrupted, or absent (except posteriorly); an irregular brownish area bordering each lateral margin posteriorly. *Dorsal integument* (♀) punctations moderately numerous, irregularly scattered, moderately large, each usually with single short white seta (sometimes indistinct), few along lateral grooves and on lateral margin and festoons. *Color* (♀) light brown, festoons partly yellowish. *Coxa I* (♂, ♀) spurs short, closely spaced, joined anteriorly, length subequal, external spur narrower than broadly triangular internal spur; II and III spurs (and ♀ IV spurs) each number 2, much shorter than I spurs. *Coxa IV* (♂) greatly enlarged, ca. $1.5\times$ as broad as long, internal margin usually straight; spurs number 3-5, size and outlines variable. *External genitalia* (♀) size moderate, broadly V-shaped, apex blunt.

Differential criteria

Dermacentor (I.) taiwanensis is easily differentiated from the 3 previously reviewed *Dermacentor (Indocentor)* species (*compactus*, *auratus*, and *atrosignatus*) (Wassef & Hoogstraal 1983, 1984a,b; see "interim key" in the last-listed publication) by the following combination of characters: ♂ scutal me-

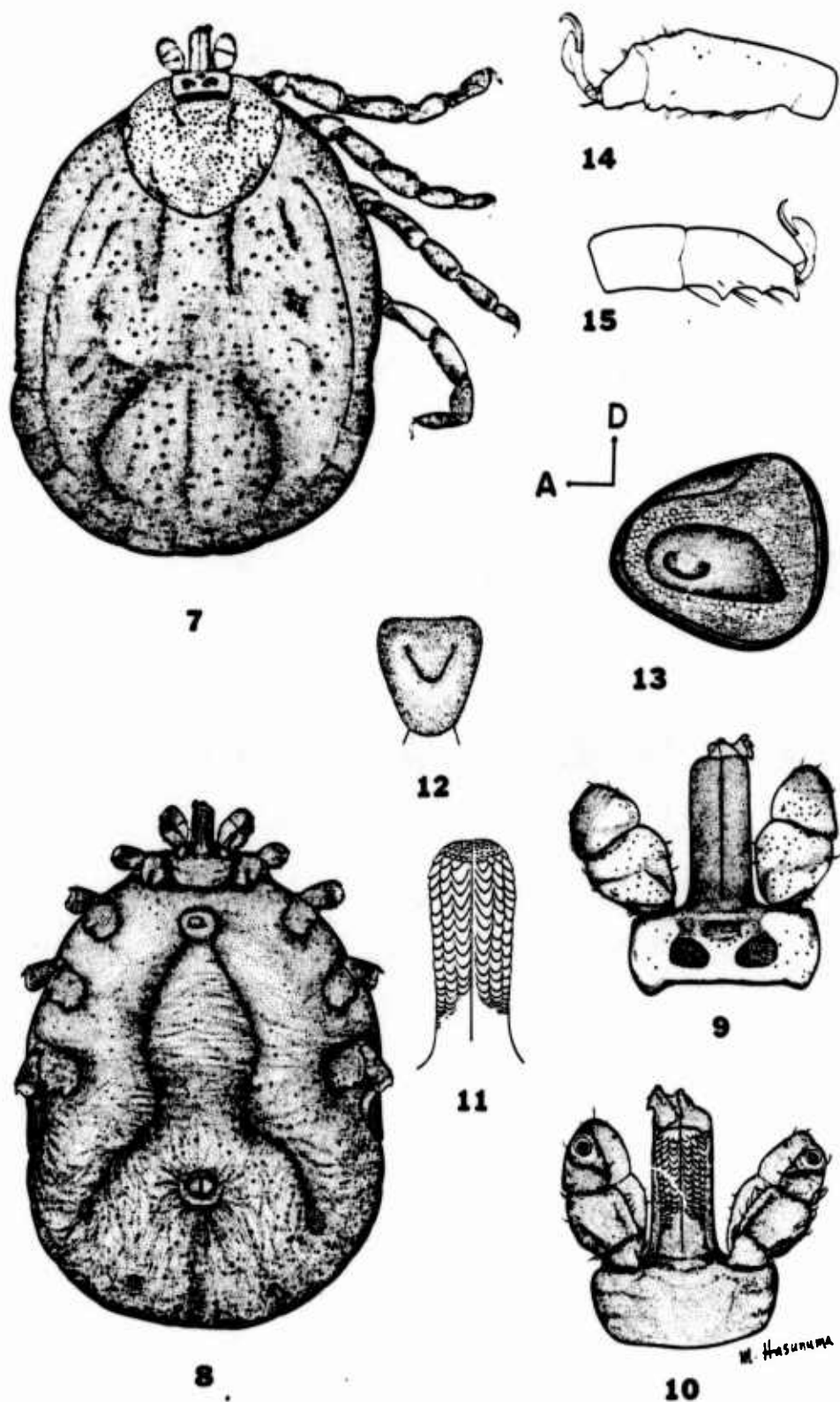


FIG. 7-15. *Dermacentor (Indocentor) taiwanensis* ♀ Taiwan: 7, dorsal view; 8, ventral view; 9, capitulum dorsal view; 10, capitulum ventral view; 11, hypostome; 12, genital area; 13, spiracular plate; 14, tarsus I external view; 15, tarsus IV external view.



FIG. 16. *Dermacentor (Indocentor) taiwanensis*, Taiwan (HH79,129): Scanning electron microscope view of ♀ external genitalia and coxae I to IV. 85×.

dian brown line absent anteriorly; pseudoscutum (♂) broader than long (not always distinctly delineated from rest of scutum); coxa IV spurs number 3–5; ♂ and ♀ coxa I spurs short, closely spaced, joined anteriorly; ♀ external genitalia broadly V-shaped, apex blunt.

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LITERATURE CITED

Arthur, D.R. 1960. *Ticks. A monograph of the Ixodoidea. Part V. On the genera Dermacentor, Anocentor, Cosmiomma, Bo-*

ophilus and Margaropus. Cambridge University Press, Cambridge. 251 p.

Hoogstraal, H. & H.Y. Wassef. 1984. *Dermacentor (Indocentor) compactus* (Acari: Ixodoidea: Ixodidae): Wild pigs and other hosts and distribution in Malaysia, Indonesia, and Borneo. *J. Med. Entomol.* 21: 174–78.

1985a. *Dermacentor (Indocentor) auratus* (Acari: Ixodoidea: Ixodidae): Hosts, distribution, and medical importance in tropical Asia. *J. Med. Entomol.* 22: 170–77.

1985b. *Dermacentor (Indocentor) atosignatus* (Acari: Ixodoidea: Ixodidae): Hosts and distribution in the Malay Peninsula, Indonesia, Borneo, and southern Philippines. *J. Med. Entomol.* 22: 644–47.

Hoogstraal, H., H.Y. Wassef, F.J. Santana & R.E. Kuntz. 1986. *Dermacentor (Indocentor) taiwanensis* (Acari: Ixodoidea: Ixodidae): Hosts and distribution in Taiwan and southern Japan. *J. Med. Entomol.* 23. (In press.)

Keegan, H.L. & S. Toshioka. 1957. *Ixodid ticks of Japan, Korea and the Ryukyu Islands*. 406th Med. Gen. Lab., Camp Zama, Japan. 37 p.

Kitaoka, S. & H. Suzuki. 1981. *Dermacentor taiwanensis* Sugimoto, 1935 (Acarina: Ixodidae): The immature stages and notes on hosts and distribution in Japan. *Trop. Med.* 23: 205–11. (Japanese summary.)

Luh, P.-L. & W.-C. Woo. 1950. A list of Chinese ticks. *Ann. Entomol. Sin.* 1: 195–222. (In Chinese, English summary.) (In English, NAMRU3-T19.)

Maa, T.C. & J.S. Kuo. 1966. Catalogue and bibliography of ticks and mites parasitic on vertebrates in Taiwan. *Q. J. Taiwan Mus.* 19: 373–413.

Sugimoto, M. 1935. On the Ixodoidea of Formosa. *Kagaku no Taiwan* 3: 1–7. (In Japanese.) (In English, NAMRU3-T1791.) 1936. On the ticks of Taiwan. *Bull. Dep. Agric. Cent. Res. Inst. Taiwan* (118). 63 p. (In Japanese.)

1937. Notes on the ticks in the Formosan mountain reservation for aborigines. *J. Cent. Soc. Vet. Med., Tokyo* 50: 303–40. (In Japanese.) (In English, NAMRU3-T11.)

Teng, K.-F. 1978. *Economic insect fauna of China*. Fasc. XV. Acarina, Ixodoidea. Science Press, Academia Sinica, Peking. 174 p. (In Chinese.) (In English, NAMRU3-T1786.)

Toumanoff, C. 1944. *Les tiques (Ixodoidea) de l'Indochine*. Institut Pasteur de l'Indochine, S.I.L.I., Saigon. 220 p.

Wassef, H.Y. & H. Hoogstraal. 1983. *Dermacentor (Indocentor) compactus* (Acari: Ixodoidea: Ixodidae): Identity of male and female. *J. Med. Entomol.* 20: 648–52.

1984a. *Dermacentor (Indocentor) auratus* (Acari: Ixodoidea: Ixodidae): Identity of male and female. *J. Med. Entomol.* 21: 169–73.

1984b. *Dermacentor (Indocentor) atosignatus* (Acari: Ixodoidea: Ixodidae): Identity of male and female. *J. Med. Entomol.* 21: 586–91.

Yamaguti, N., V.J. Tipton, H.L. Keegan & S. Toshioka. 1971. *Ticks of Japan, Korea, and the Ryukyu Islands*. Brigham Young Univ. Sci. Bull., Biol. Ser. 15. 226 p.



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