



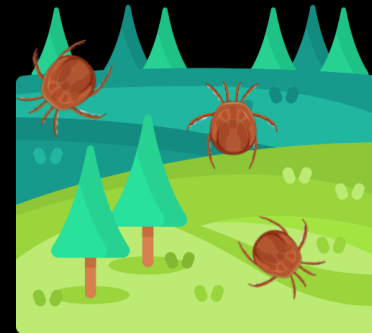
# **AMBLYOMMA (BONT TICKS) OF SOUTHEAST ASIA: AN OVERVIEW ON ITS DIVERSITY, HOST ASSOCIATIONS, AND ASSOCIATED PATHOGENS**

**Ace Kevin Amarga, PhD & Ming-Chung Chiu, PhD**

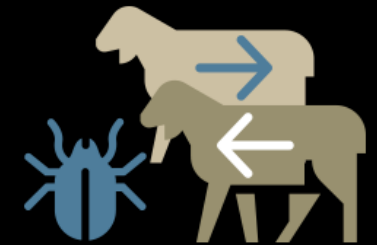
Department of Entomology, National Taiwan University  
IUCN SSC Parasite Specialist Group, Gland, Switzerland



Species & Genetic  
Diversity



Ecology & Behavior



Transmission  
Pathway(s)





Ticks associated with wildlife vertebrates are relatively understudied in SE Asia



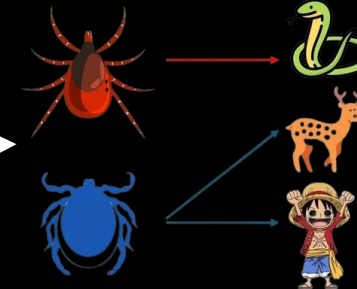
Few specialists of Asiatic Ticks



Knowledge gaps on different aspects of natural history



Distribution Patterns



Host Affinities



Phylogenetic relationships

Class ARACHNIDA

Superorder  
PARASITIFORMES

Order IXODIDA  
[Ticks]

Superfamily IXODOIDEA

235. ACARUS. *Pedes VIII.*  
*Oculi II, ad latera capitis,*  
*Tentacula duo, articulata, pedi-*  
*formia.*

elephan- 1. *A. orbicularis depressus: macula bascos ovata.*  
tius. *Habitat in India.*  
*Magnitudo seminis Lupini albi, depressus, lividus mar-*  
*gine crasso, subtus utrinque 3 sulcis. Macula bascos*  
*nigra, ovata, trifida.*

ægyptius. 2. *A. obovatus fuscus margine albo. M. L. U.*  
*Habitat in Oriente.*

Reduvius. 3. *A. obovatus planus macula bascos obovata.*  
*Fn. suec. 1192. It. aland. 62. 126.*  
*Raj. inf. 9.*  
*Habitat in Bobus, Canibus, sylvis.*

america- 4. *A. obovatus rubicundus, scutello geniculisque pedum*  
nus. *albidis.*  
*Kalm. act. Stockb. 1754.*  
*Habitat in America.*

sanguisu- 5. *A. abdomine postice crenato, scutello ovato subfulvo,*  
gus. *rostro tripartito.*  
*Habitat in America. Rolander.*  
*Pedes antici ad exortum spinis brevibus. Sanguinem in*  
*tibiis obambulantium haurit vix extrahendus.*

Ricinus. 6. *A. globoso-ovatus macula bascos rotunda, antennis*  
*clavatis.*  
*Fn. suec. 1193. Raj. inf. 10.*  
*Aldr. inf. 559. Frisch. inf. 5. t. 19.*  
*Habitat in Bobus, Canibus.*

Q 9 4

7. A.

*Acarus aegyptius* (now *Hyalomma aegyptium*)



© Linnean Society of London

*Acarus ricinus* (now *Ixodes ricinus*)



© Linnean Society of London

Linnaeus (1758). Syst. Nat. page 615

---

TICKS evolved as an  
ectoparasites of  
VERTEBRATES



Amphibia



Reptilia



Mammalia



Aves

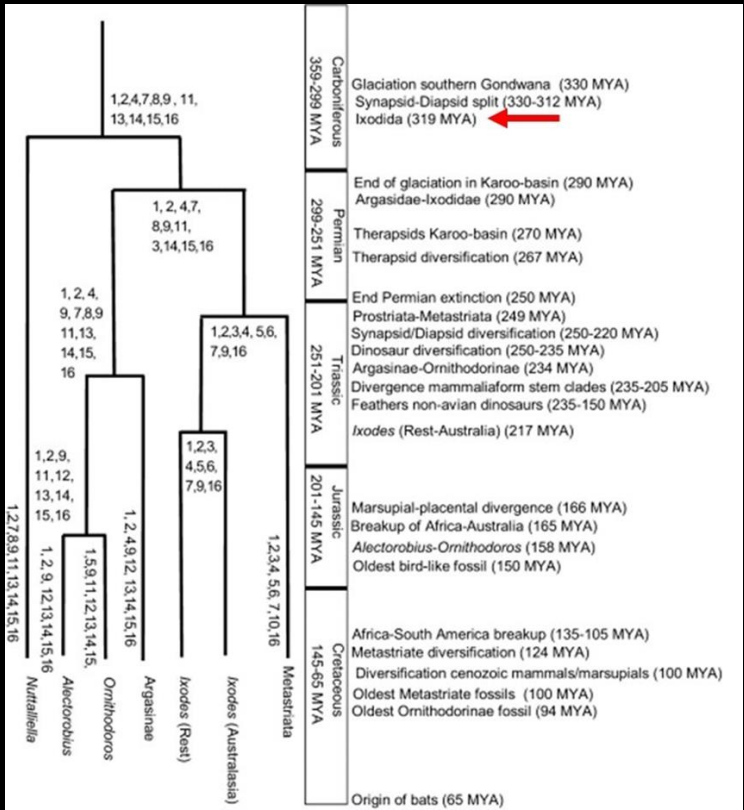
# TICKS are ANCIENT ECTOPARASITES



© Damien Brouste

Order Holothyrida is sister to Order Ixodida (Klompen 2010).

Holothyrids- scavenger mites with Gondwanan distribution



Mans et al. (2016)

nature COMMUNICATIONS

ARTICLE

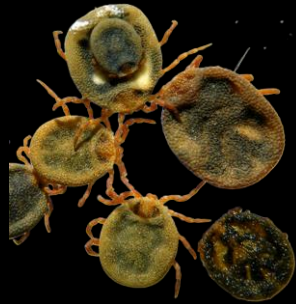
DOI: 10.1038/s41467-017-01550-z OPEN

## Ticks parasitised feathered dinosaurs as revealed by Cretaceous amber assemblages

Enrique Peñalver<sup>1</sup>, Antonio Arillo<sup>2</sup>, Xavier Delclòs<sup>3</sup>, David Peris<sup>4</sup>, David A. Grimaldi<sup>5</sup>, Scott R. Anderson<sup>6</sup>, Paul C. Nascimbene<sup>5</sup> & Ricardo Pérez-de la Fuente<sup>7</sup>

*Deinocroton draculi*

## EXTANT TICK FAMILIES



### NUTTALLIELLIDAE [nuttalliellid tick]

3 genera; 1 extant species  
Endemic in Africa



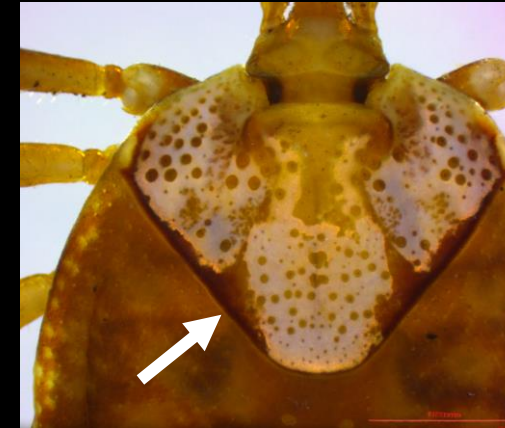
### ARGASIDAE [soft ticks]

190+ species worldwide



### IXODIDAE [hard ticks]

700+ species worldwide



Scutum



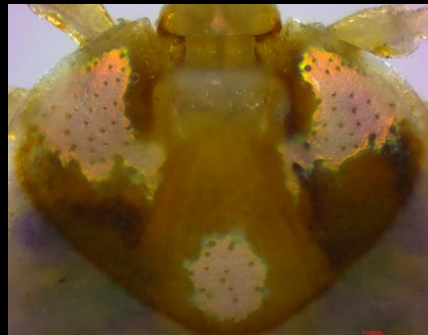
*Amblyomma* Koch, 1844  
[bont ticks]



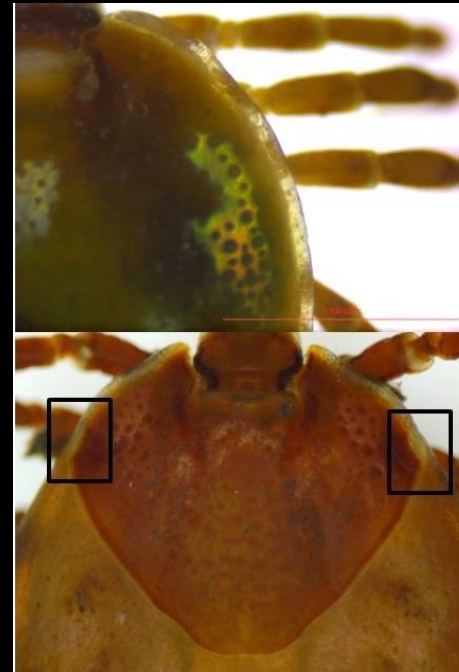
Elongated palpus



Denticulate hypostome



Ornate scutum



Presence or absence  
of eyes



Presence prominent festoons



Sexual dimorphism in *Amblyomma*  
Female (top) and Male (bottom)



Gynandromorphism

Kwak et al. 2023

## SOUTHEAST ASIAN *Amblyomma*



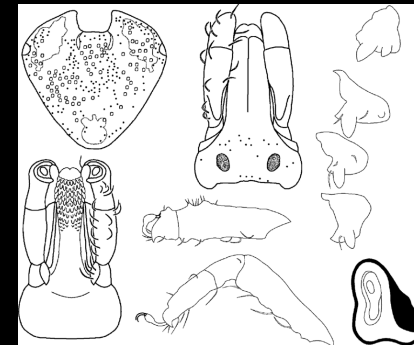
16 species are known



Mostly associated with  
herpetofauna



Most widespread: *A. helvolum*



Ref. Voltzit & Keirans 2002

Most restricted: *A. robinsoni*



---

## Museum specimen examination



Smithsonian Institution  
(USA)



Yale University Peabody Museum  
of Natural History (USA)



National Science Museum  
(Thailand)



American Museum of Natural  
History (USA)

# Amblyomma geoemydae (Cantor)

Ticks and Tick-borne Diseases 13 (2022) 101958

Contents lists available at ScienceDirect

Ticks and Tick-borne Diseases

journal homepage: [www.elsevier.com/locate/ttbdis](http://www.elsevier.com/locate/ttbdis)

Original article

The Asian turtle tick *Amblyomma geoemydae* Cantor, 1847 (Acari: Ixodidae) in the Philippines: first confirmed local host and locality with a complete host index

Ace Kevin S. Amarga<sup>a,b,\*</sup>, Christian E. Supsup<sup>c</sup>, Hui-Yun Tseng<sup>d</sup>, Mackenzie L. Kwak<sup>e</sup>, Si-Min Lin<sup>a,b</sup>

<sup>a</sup>Biodiversity Program, Taiwan International Graduate Program, Biodiversity Research Center, Academia Sinica, Nangang District, Taipei 11529, Taiwan  
<sup>b</sup>School of Life Science, National Taiwan Normal University, Wenshan District, Taipei 11677, Taiwan  
<sup>c</sup>Biology Department, De La Salle University, 2401, Taft Avenue, Manila, 1004 Philippines  
<sup>d</sup>Department of Entomology, National Taiwan University, No. 1, Sec. 4, Roosevelt Rd., Da'an District, Taipei City 106, Taiwan  
<sup>e</sup>Department of Biological Science, National University of Singapore, 10 Science Drive 4, 117556, Singapore

Systematic & Applied Acarology 30(1): 7–12 (2025)  
<https://doi.org/10.11158/saa.30.1.2>

ISSN 1362-1971 (print)  
 ISSN 2056-6069 (online)

Correspondence

**New host and geographic records of *Amblyomma geoemydae* (Cantor) (Ixodidae: Amblyomminae) from southern China and Southeast Asia**

ACE KEVIN S. AMARGA<sup>1,2,3\*</sup>, RICHARD G. ROBBINS<sup>4,5,6</sup>, HUI-YUN TSENG<sup>7\*</sup> & SI-MIN LIN<sup>1,2\*</sup>

臺灣研蟲誌 Taiwanese Journal of Entomological Studies 9(2): 14–15 (2024)

[科學短訊 Scientific Communication]  
<https://doi.org/10.5281/zenodo.12532338>

**First Record of *Amblyomma geoemydae* (Cantor) (Ixodida: Ixodidae) on *Cuora couro* (Sunda box turtle) (Testudines: Geoemydidae) in the Philippines**

ACE KEVIN S. AMARGA<sup>1,2,3</sup>, PETER JOHN CACAYAN<sup>4</sup>

<sup>1</sup>Biodiversity Program, Taiwan International Graduate Program, Biodiversity Research Center, Academia Sinica, Nangang District, Taipei 11529, Taiwan. Email: [ace\\_amarga061@yahoo.com](mailto:ace_amarga061@yahoo.com)  
<sup>2</sup>School of Life Science, National Taiwan Normal University - Gongguan Campus, Wenshan District, Taipei 11677, Taiwan  
<sup>3</sup>International Union for Conservation of Nature Species Survival Commission (IUCN SSC) Parasite Specialist Group  
<sup>4</sup>Marshland Documentation Services, Puerto Princessa, Palawan, Philippines



*A. geoemydae* (male)

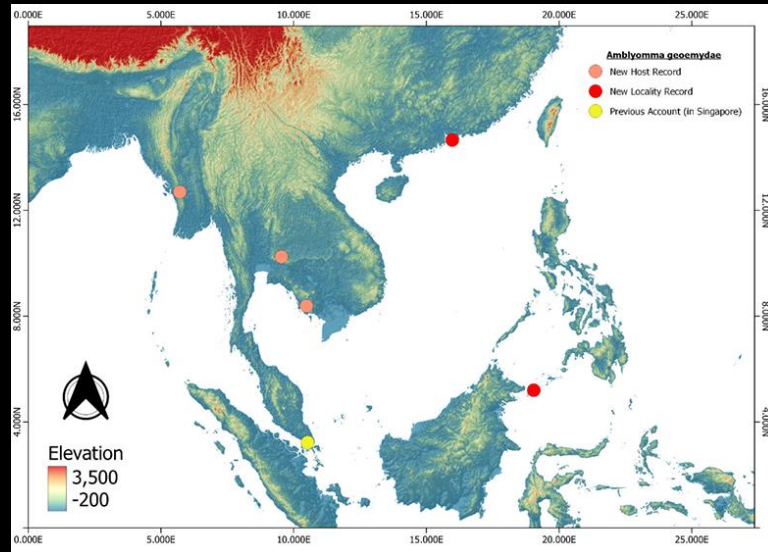


Primarily parasitic to Geoemydidae & Testudinidae

Correspondence

**New host and geographic records of *Amblyomma geoemydae* (Cantor) (Ixodidae: Amblyomminae) from southern China and Southeast Asia**

ACE KEVIN S. AMARGA<sup>1,2,3\*</sup>, RICHARD G. ROBBINS<sup>4,5,6</sup>, HUI-YUN TSENG<sup>7\*</sup> & SI-MIN LIN<sup>1,2\*</sup>



**NEW HOST RECORDS COLLECTED FROM MAINLAND SE ASIA**

*Malayemys macrocephala* (Thailand)

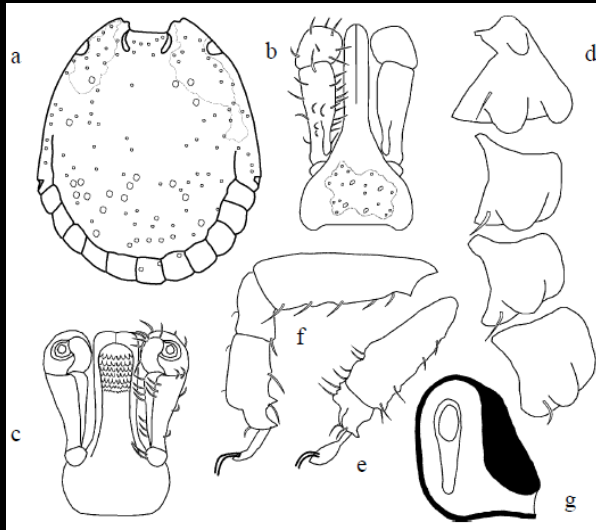
*Cyclemys oldhamii* (Thailand)

*Cyclemys fusca* (Myanmar)

*Cyclemys atripons* (Cambodia)



TURTLE TICKS IN ASIATIC REGION  
OF ORIENTAL FAUNAL REALM



*Amblyomma clypeolatum* Neumann

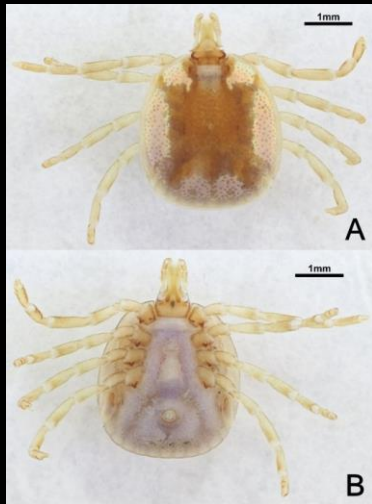
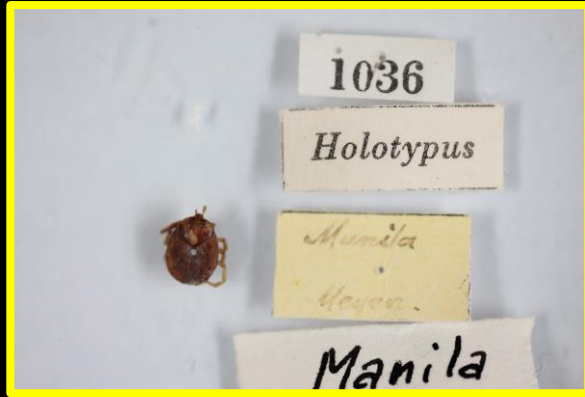


*Amblyomma supinoi* Neumann



*Amblyomma geoemydae* (Cantor)

*Amblyomma helvolum* Koch



*A. helvolum* (male)



*A. helvolum* on *Varanus rasmusseni*  
(Rasmussen's water monitor)



*A. helvolum* on *Tropidophrous grayi*  
(Spiny waterside skink)

The Thailand Natural History Museum Journal 14(2), 87-91, 31 December 2022  
©2022 by National Science Museum, Thailand  
<http://doi.org/10.14456/thlmj.2022.9>

**New Locality Record for the Reptile Tick *Amblyomma helvolum* Koch, 1844 (Acari: Ixodidae) on the Bicol Peninsula, Luzon Island, Philippines**

Ace Kevin S. Amarga<sup>a1,2</sup>, Geleena A. Gestada<sup>a</sup> and Christian B. Cuevas<sup>d</sup>

<sup>a</sup>Biodiversity Program, Taiwan International Graduate Program, Biodiversity Research Center, Academia Sinica, Nangang District, Taipei 11529, Taiwan.

<sup>b</sup>School of Life Science, National Taiwan Normal University- Gongguan Campus, Wenshan District, Taipei 11677, Taiwan.

<sup>c</sup>Asia Pacific College- Senior High School, Magallanes, Makati City, Metro Manila 1232, Philippines.

<sup>d</sup>Philippine Center for Environmental Awareness and Sustainability, Inc., Vega Centre, Los Baños, Laguna 4031, Philippines.



臺灣研蟲誌 Taiwanese Journal of Entomological Studies 8(4): 88-90 (2023)

[研究文章 Research Article]

<https://doi.org/10.5281/zenodo.10429714>

**Record of the Reptile Tick *Amblyomma helvolum* Koch, 1844 (Ixodidae: Amblyomninae) Collected from Sorsogon Province (Luzon Island), with a List of Squamate Hosts in the Philippines**

ACE KEVIN S. AMARGA<sup>a,2,3</sup>

<sup>1</sup>Biodiversity Program, Taiwan International Graduate Program, Biodiversity Research Center, Academia Sinica, Nangang District, Taipei 11529, Taiwan. Email: [ace\\_amarga061@yahoo.com](mailto:ace_amarga061@yahoo.com)

<sup>2</sup>School of Life Science, National Taiwan Normal University- Gongguan Campus, Wenshan District, Taipei 11677, Taiwan.

<sup>3</sup>International Union for Conservation of Nature Species Survival Commission (IUCN SSC) Parasite Specialist Group.

**Amarga AKS, Del Prado YLC, Diesmos MLL, Diesmos AC, Lin S-M (2024) *Varanus rasmusseni* (Rasmussen's water monitor). Ectoparasite. Herpetological Review 52(2): 268.**

**Amarga AKS, Corvera M, Binaday JW, Sarmiento MJ, Manalo RI, Lin S-M (2024) *Coelognathus erythrurus manillensis* (Luzon red-tailed rat snake). Ectoparasite. Herpetological Review 52(2): 274-275.**

**Amarga AKS, Corvera M, Binaday JW, Sarmiento MJ, Manalo RI (2024) *Boiga dendrophila latifasciata* (Gold-ringed cat snake). Ectoparasite. Herpetological Review 55(4): 576-577.**

Ticks and Tick-borne Diseases 14 (2023) 102224

Contents lists available at ScienceDirect

Ticks and Tick-borne Diseases

journal homepage: [www.elsevier.com/locate/tbdis](http://www.elsevier.com/locate/tbdis)



ELSEVIER



Original article

**The East Indies reptile tick *Amblyomma helvolum* Koch, 1844 (Acari: Ixodidae), taxonomy, biology and new host records, including the first record of human infestation**

Mackenzie L. Kwak<sup>a,\*</sup>, Max D. Jones<sup>b</sup>, Madison E.A. Harman<sup>c</sup>, Samantha N. Smith<sup>d</sup>, Anji D'souza<sup>e</sup>, Tyler Knierim<sup>d</sup>, Curt H. Barnes<sup>f</sup>, Surachit Waengsothorn<sup>d</sup>, Ace Kevin S. Amarga<sup>g</sup>, Chi-Chien Kuo<sup>h</sup>, Ryo Nakao<sup>h</sup>



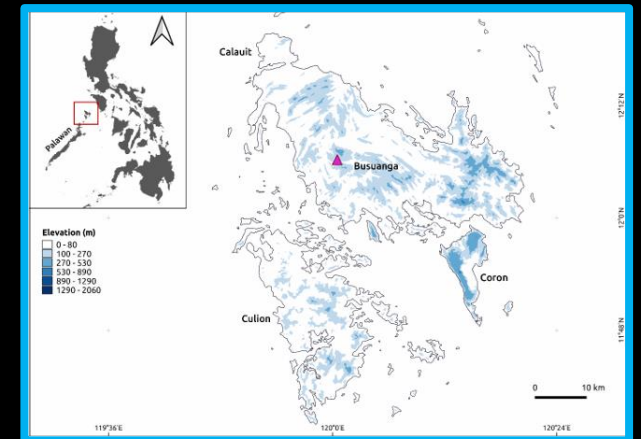
Fig. 9. Female *Amblyomma helvolum* infesting a human in Singapore.



*A. helvolum* on *Naja kaouthia* (Monocled cobra)



## *Amblyomma varanense* (Supino)



Systematic & Applied Acarology 28(8): 1305–1319 (2023)  
<https://doi.org/10.11158/saa.28.8.3>

ISSN 1362-1971 (print)  
ISSN 2056-6069 (online)

### Article

**Host associations of the Asian monitor lizard tick *Amblyomma varanense* (Supino, 1897) (Ixodida: Ixodidae), with a new host record from the Philippines**

ACE KEVIN S. AMARGA<sup>1,2,3\*</sup>, RICHARD G. ROBBINS<sup>4,5,6</sup> & SI-MIN LIN<sup>1,2</sup>

<sup>1</sup> Biodiversity Program, Taiwan International Graduate Program, Biodiversity Research Center, Academia Sinica, Nangang District, Taipei 11529, Taiwan

<sup>2</sup> School of Life Science, National Taiwan Normal University, Wenshan District, Taipei 11677, Taiwan

<sup>3</sup> International Union for Conservation of Nature Species Survival Commission (IUCN SSC) Parasite Specialist Group

<sup>4</sup> Walter Reed Biosystematics Unit, Smithsonian Institution, Museum Support Center, Suitland, Maryland 20746, U.S.A.

<sup>5</sup> One Health Branch, Walter Reed Army Institute of Research, Silver Spring, Maryland 20910, U.S.A.

<sup>6</sup> Department of Entomology, Smithsonian Institution, National Museum of Natural History, Washington, DC 20560

\*Corresponding author. E-mail address: [ace\\_amarga061@yahoo.com](mailto:ace_amarga061@yahoo.com)

*A. varanense* on *Varanus palawanensis*  
(Palawan water monitor)

---

*Amblyomma nitidum* Hirst & Hirst



Habitus of *A. nitidum* female  
(dorsum)



*A. nitidum* on *Laticauda laticaudata*



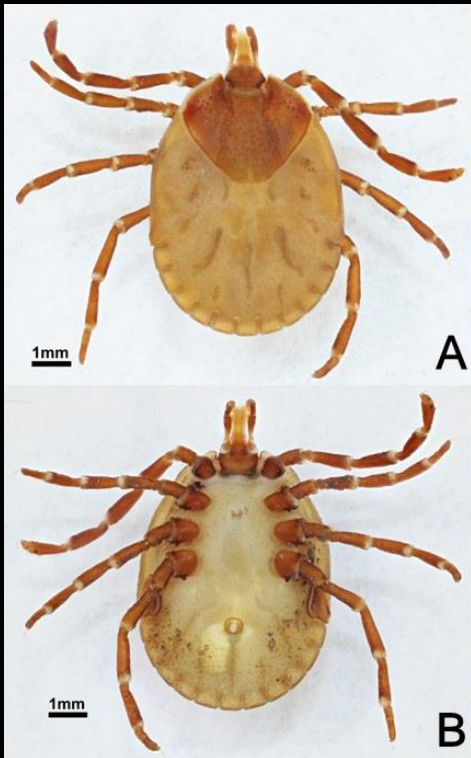
*A. nitidum* on *Laticauda colubrina*

The natural history of the sea snake tick  
*Amblyomma nitidum*  
(Manuscript currently in press.)



*Laticauda colubrina*  
(Yellow-lipped sea krait)

## *Amblyomma cordiferum* (Neumann)



Female *A. cordiferum*

*Systematic & Applied Acarology* 28(5): 815–827 (2023)  
<https://doi.org/10.11158/saa.28.5.4>

ISSN 1362-1971 (print)  
ISSN 2056-6069 (online)

Article <http://zoobank.org/urn:lsid:zoobank.org:pub:FC04A231-0DF3-42E3-8B27-BB567B1EEA0A>

**Host associations of the snake tick *Amblyomma cordiferum* Neumann, 1899 (Ixodida: Ixodidae), with new host records from Taiwan**

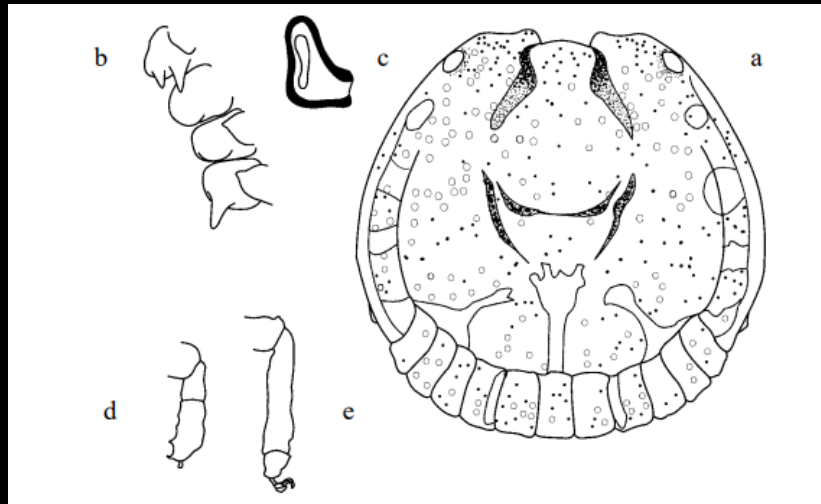
ACE KEVIN S. AMARGA<sup>1,2\*</sup>, WEN-LOUNG LIN<sup>3</sup>, YU-SYUAN FU<sup>2</sup>, WEI-HSIUAN FANG<sup>3,4</sup>,  
RICHARD G. ROBBINS<sup>5,6,7</sup> & SI-MIN LIN<sup>1,2</sup>

**Australasian and Oriental Regions**

Mainly on reptiles and  
occasional on mammals

**No one has ever seen a male  
since 1899!**

*Amblyomma crenatum* Neumann



Ref. Voltzit & Keirans 2002

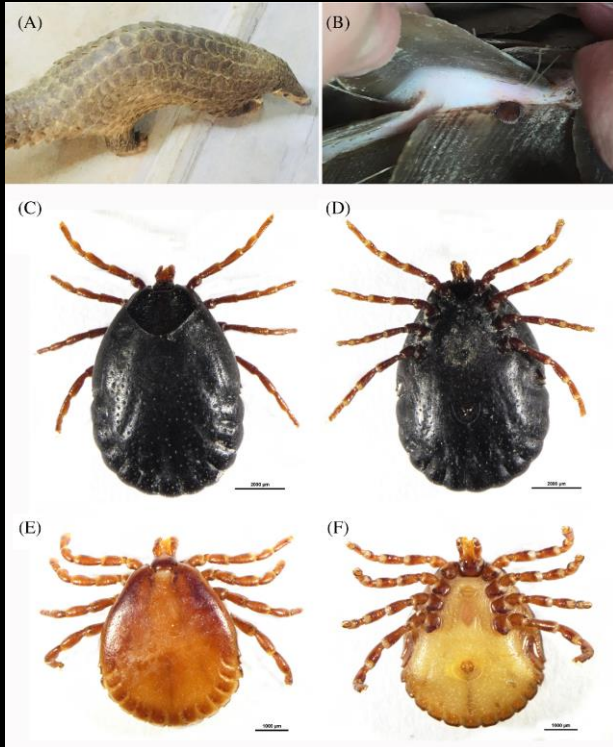
Critically co-endangered

Parasitic to the critically endangered  
Javan Rhinoceros  
(*Rhinoceros sondaicus*)



© International Rhino Foundation

## *Amblyomma javanense* Supino

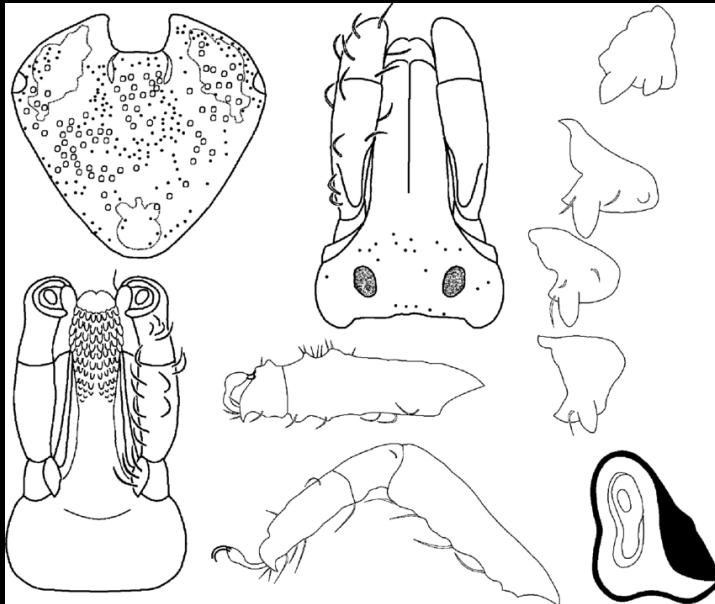


Ref. Duan et al. 2019

Parasitic primarily to Oriental pangolins  
(e.g., *Manis javanica*, *M. crassicaudata*,  
*M. culionensis*)



*Amblyomma robinsoni* Warburton



Ref. Voltzit & Keirans 2002

Parasitic only to Komodo dragon  
(*Varanus komodoensis*)



## Teratologies on *Amblyomma*

*Systematic & Applied Acarology* 29(11): 1460–1471 (2024)  
<https://doi.org/10.11158/saa.29.11.2>

ISSN 1362-1971 (print)  
ISSN 2056-6069 (online)

Article

### First report of teratological anomalies in *Amblyomma* and *Dermacentor* ticks (Acari: Ixodida: Ixodidae) from Taiwan and the Philippines

ACE KEVIN S. AMARGA<sup>1,2,3\*</sup>, RICHARD G. ROBBINS<sup>4,5,6</sup> & HUI-YUN TSENG<sup>7\*</sup>

<sup>1</sup> Biodiversity Program, Taiwan International Graduate Program, Biodiversity Research Center, Academia Sinica, Nangang District, Taipei 11529, Taiwan

<sup>2</sup> School of Life Science, National Taiwan Normal University, Wenshan District, Taipei 11677, Taiwan

<sup>3</sup> International Union for Conservation of Nature Species Survival Commission (IUCN SSC) Parasite Specialist Group

<sup>4</sup> Walter Reed Biosystematics Unit, Smithsonian Institution, Museum Support Center, Suitland, Maryland 20746, U.S.A.

<sup>5</sup> One Health Branch, Walter Reed Army Institute of Research, Silver Spring, Maryland 20910, U.S.A.

<sup>6</sup> Department of Entomology, Smithsonian Institution, National Museum of Natural History, Washington, DC 20560, U.S.A.

<sup>7</sup> Conservation & Evolutionary Biology Lab, Department of Entomology, National Taiwan University, No. 1, Sec. 4, Roosevelt Rd., Da'an District, Taipei City 106, Taiwan

\* Corresponding authors: [ace\\_amarga061@yahoo.com](mailto:ace_amarga061@yahoo.com); [hytseng1216@ntu.edu.tw](mailto:hytseng1216@ntu.edu.tw)



Leg I atrophy on *Amblyomma helvolum* from Philippines

## Ticks as zoonotic disease vectors

Lyme Disease  
(a.k.a. Borreliosis)

Rocky Mountain  
Spotted Fever

Tick-borne Relapsing  
Fever

Queensland tick typhus

Human granulocytic  
anaplasmosis



Human Babesiosis

Tick-borne Tularemia

Helvetica spotted fever

Crimean-Congo  
Hemorrhagic Fever

Severe Fever with  
Thrombocytopenia  
Syndrome

## *Amblyomma* as pathogen vectors



Disease association of many Asian *Amblyomma* species are not well-known and are poorly studied!



Novel *Borrelia* related to Relapsing Fever in Japan (Takano et al. 2011)

Novel *Ehrlichia* & *Rickettsia* in Japan (Qiu et al. 2021)



Novel *Borrelia* related to Relapsing Fever in Indonesia (Supriyono et al. 2019)



Novel *Rickettsia* in Japan (Qiu et al. 2021)



Unidentified virus from snake in Malaysia (Audy et al. 1960)

---

## GAPS & POTENTIAL FUTURE WORKS

Extensive fieldwork for uncovering extent of host affinity

Revisiting cryptic species

Evolutionary histories of Asiatic amblyommines

Evolution & purpose of coloration in *Amblyomma*

Pathogenicity *Amblyomma*-associated microbiota

Genetic diversity of *Amblyomma*-associated microbiota

---

## ACKNOWLEDGMENT

Smithsonian Institution (USA)

Yale University Peabody Museum (USA)

American Museum of Natural History (USA)

Herpetology Collection- National Science Museum (Thailand)

Museum für Naturkunde (Germany)

National Science & Technology Council (NSTC) (Taiwan)



**THANK YOU FOR  
LISTENING!!!**

