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Biodiversity of Cockroaches (*Blattodea*) from Jawadhu Hills, Tirupathur District, Tamil Nadu, India

Prabakaran S., Nagarajan D., Soundararajan V.

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ABSTRACT

Worldwide, cockroach diversity is extensive with the majority of species found in tropical regions and just a few found in temperate climates. In the dynamic ecosystem of the Jawadhu Hills of the Eastern Ghats, Tirupathur District, Tamil Nadu, India, where cockroaches are crucial to ecological processes, the current study was carried out. Twenty-two species, thirteen genera, eight subfamilies, and four families were represented by the 138 specimens that were gathered and classified. Following the families *Ectobiidae* (two subfamilies, three genera, seven species), *Blattidae* (one subfamily, one genus, four species), and *Corydiidae* (one subfamily, one genus, three species), the family *Blaberidae* (four subfamilies, six genera, and seven species) was the most prevalent among these. Additionally, the survey recorded five foreign cockroach species (*Pycnoscelus surinamensis, Blatta orientalis, Periplaneta americana, Blattella germanica,* and *Supella longipalpa*) and three indigenous species. These results offer the first baseline evaluation of cockroach diversity in this area and emphasize the necessity of additional ecological research to fully comprehend their contributions to regional biodiversity and ecosystem function.

Keywords Cockroach, *Pycnoscelus surinamensis, Blatta orientalis, Periplaneta americana, Blattella germanica, Supella longipalpa,* Diversity, Jawadhu hills, Eastern ghats, Blaberidae, Ectobiidae, Blattidae, Corydiidae, Endemic cockroach, Ecosystem, Tropical regions, Temperate climates.

INTRODUCTION

Cockroaches first emerged about 235 million years ago, long before the Pangaea super continent broke apart. Continental drift has played a major role in shaping their global distribution, and diversification has taken place when landmasses have split. Furthermore, some species spread throughout the oceans, demonstrating a complex biogeographical past influenced by both dispersion and vicariance Vršanský and Kazimírová (2023). Primarily common

Prabakaran S.[1], Nagarajan D.[2]*, Soundararajan V.[3]

[1]Scientist-E
[1,2]Marine Biology Regional Center, Zoological Survey of India, Chennai 600028, Tamil Nadu, India

[3]Scientist-E, ICFRE - Tropical Forest Research Institute, Jabalpur 482021, Madhya Pradesh, India

Email: prabakaranzsi@yahoo.co.in
*Corresponding author

in tropical and subtropical environments, cockroaches are a very diversified and important ecological group. There are only around 30 species that are frequently considered pests in human habitats. Their adaptability and important roles in nutrient cycling contribute to their evolutionary success (Bell *et al.* 2007). The prevalence of cockroach infestations varies according on climate, sanitation, and food availability. The most common indoor species, particularly in homes and hospitals, is the German cockroach (*Blattella germanica*). Understanding cockroach biology and behavior, enhancing cleanliness, and using commercial pesticides correctly are all necessary for effective cockroach control (Memona *et al.* 2017). Cockroaches thrive in urban environments due to abundant food, shelter, warmth, and humidity. Once established, they are challenging to eradicate due to their flexibility and persistence. To safeguard property and health, comprehensive preventative and eradication measures are required (Pelican Pest Control 2024). Cockroaches are one of the most successful and varied insect families, and they are essential to the upkeep of ecosystems. Cockroaches, as they are commonly called, are mostly decomposers that break down organic waste and recycle nutrients back into the soil by feeding on dead plants and animals. The growth of plants and the general productivity of ecosystems are supported by this nutrient recycling. Cockroaches also contribute to biodiversity and the balance of the food chain by providing a significant food supply for a variety of creatures, including birds, reptiles, and amphibians. Cockroaches are typically dark-colored, sclerotized insects that can be found in a variety of environments. There are over 5,793 species of cockroaches in 12 families, which are divided into 521 genera (Beccaloni 2014). Although they tend to remain solitary, they occasionally congregate and exhibit certain social behaviors. Seven families, including 65 taxa and 179 species, have been identified in India (Prabakaran and Senraj 2024). Climate, vegetation, and geography are only a few among the biological and environmental elements that affect insect diversity and abundance.

MATERIALS AND METHODS

Samples were taken in Andiyappanur (12.4867° N, 78.7136° E), Poongulam (12.4082° N, 78.7249° E), and Melpattu (12.4894° N, 78.5679° E) in the Jawadhu Hills, Tirupathur District, Tamil Nadu. Pitfall traps, light traps, and hand collections were among the techniques used to gather specimens with the objective to ensure comprehensive sampling of the cockroach fauna. The gathered specimens were meticulously conserved and identified by means of in-depth morphological analyses.

RESULTS AND DISCUSSION

Order: *Blattodea*
Superfamily: *Blaberoidea* Saussure, 1864
Family: *Blaberidae* Saussure, 1864
Subfamily: *Epilamprinae*
Genus: *Calolamprodes* Bey-Bienko, 1969

***Calolamprodes characterosa* (Walker 1868)**

Material Examined: Andiyappanur (12.4867° N, 78.7136° E), Jawadhu Hill, Tirupathur Dist, Tamil Nadu, India, 03 exs, 18.iv.2025, Coll. D. Nagarajan., ZSI Regd. No. MISE/INS/052.

Diagnosis: This *Calolamprodes characterosa* was described by Walker in 1868 from a genus of *Epilampra* from Bengal, India. This species is one of seven species in this subgenus. Although the male genital phallomere makes it easy to distinguish this species, all of the species have the same morphology. There is some variety in the femoral configuration. All tarsal segments are positioned epically by the pulvilli; the hind metatarsus has pulvilli in the apical region that are covered with spines, as well as a single row of spines positioned laterally in the first tarsal segment.

Geographic distribution: The geographic range of the species *Calolamprodes characterosa* is mostly in India and Sri Lanka. It is specifically found in the Indian states of West Bengal, Karnataka, and Tamil Nadu. It has also been documented outside of India in Sri Lanka.

Genus *Phlebonotus* Saussure 1862

***Phlebonotus pallens* (Serville 1831)**

Material Examined: Poongulam (12.4082° N,

78.7249° E), Jawadhu Hill, Tirupathur Dist, Tamil Nadu, India, 01 exs, 19.iv.2025, Coll. D. Nagarajan., ZSI Regd. No. MISE/INS/041.

Diagnosis: The *Phlebonotus pallens* (Serville 1831) easily distinguished from *P. anomalus* (Saussure 1863) by shape, and the shape of the Pronotum similar to *Thorax pocellana* but it can easily different by presence of distinct Cubitus vein posterior in the Tegmina. In *T. pocellana* is not visible simply reduced. In compare to *Phlebonotus anomalus* Saussure 1863 this is little bigger in size.

Remarks: The wing venation of this species is similar to that of *T. porcellana*, and the primary morphological characteristic that sets it apart is the absence of punctuations in the pronotum. This species was first recorded from Assam by Bolivar in 1897, and then from West Bengal by Kirby in 1904.

Genus: *Thorax* Saussure 1862

***Thorax porcellana* (Saussure 1862)**

Material Examined: Poongulam (12.4082° N, 78.7249° E), Jawadhu Hill, Tirupathur Dist, Tamil Nadu, India, 03 exs, 19.iv.2025, Coll. D. Nagarajan., ZSI Regd. No. MISE/INS/053.

Diagnosis: This species is easily diagnosed by the morphological observation by pronotum and tegmina having less black punctuation. Tegmina with well sclerotized venations not visible normally; with sub-costal vein having white thickened marking seen in ventral side.

Geographic distribution: The geographic range of the *Thorax porcellana* species is mostly in India and Sri Lanka. Tamil Nadu, Kerala, Karnataka, Goa, Lakshadweep Island, Orissa, and other southern and some central Indian states are home to it. It has also been observed outside of India in Australia and Sri Lanka.

Ecological and biological notes: *Thorax porcellana* is an ovoviviparous cockroach species where the mother shelters and feeds her young under her dome-shaped forewings for about seven weeks. The nymphs consume a pinkish secretion from the mother and also pierce her cuticle to feed on her hemolymph using specialized mandibular teeth, which they lose after early development stages (Bhoopathy1998).

Subfamily: *Panesthiinae*
Genus: *Panesthia* Serville 1831
***Panesthia quinquedentata* (Kirby 1903)**

Material Examined: Melpattu (12.4894° N, 78.5679° E), Jawadhu Hill, Tirupathur Dist, Tamil Nadu, India, 05 exs, 20.iv.2025, Coll. D. Nagarajan., ZSI Regd. No. MISE/INS/054.

Diagnosis: Morphologically dorsal and ventral sides dark in color, Ocelli very small, face fully black clypeus pale yellow, legs all are slightly dark reddish. Overall specimen length around 34-36 mm. Face with mild punctuation, pronotum with a pair of small excavation in the anterior side with blend. Middle region of the pronotum having a pair of blunt tubercles, lateral surface with a mild punctuation. Mesonotum and metanotum also having a mild punctuation. Tegmina and wings are absent, abdominal tergites hairless, well punctuated and the lateral corners of the tergum without holes. The lateral margin of T7 having a spiny edge; supra-anal plate with mild punctuation and the lateral corner of the supra-anal plate with 3 shallow teeth like projections are present. Front femur with 2 spines in the proceeding area and terminating a small apical spine.

Geographic distribution: *Panesthia quinquedentata* is found in southern India, specifically in Tamil Nadu. Its known geographic distribution does not extend beyond this region (Prabakaran *et al.* 2009).

Subfamily: Perisphaerinae
Genus: *Pseudoglomeris* Brunner Von Wattenwyl 1893

***Pseudoglomeris glomeris* (Saussure 1863)**

Material Examined: Poongulam (12.4082° N, 78.7249° E), Jawadhu Hill, Tirupathur Dist, Tamil Nadu, India, 01 exs, 19.iv.2025, Coll. D. Nagarajan., ZSI Regd. No. MISE/INS/055.

Diagnosis: Adult male dark brown, Pronotum dark drown without any punctuation and the lateral margin

flat. The antennal small dark brown and reaches up to the half of the abdomen length. Tegmina and wings are well developed reaches beyond the abdomen; female wings absent. Abdominal tergum and sternum dark brown and the legs are dark brown. Front femur Type C without any apical spines. Abdominal tergum without any modification, Face without markings dark brown, ocular distance reduced.

Geographic distribution: *Pseudoglomeris glomeris* is distributed widely across India, including Karnataka, Meghalaya, West Bengal, Tripura, Arunachal Pradesh, Tamil Nadu, Gujarat, Maharashtra, Bihar, Orissa, and Madhya Pradesh, as well as in Sri Lanka, Pakistan, Kenya, Israel, and Mozambique. The species is thus widespread across South Asia and extends into parts of Africa and the Middle East.

Subfamily: Pycnoscelinae
Genus: *Pycnoscelus* Scudder 1862

***Pycnoscelus surinamensis* (Linnaeus 1758)**

Material Examined: Andiyappanur (12.4867° N, 78.7136° E), Jawadhu Hill, Tirupathur Dist, Tamil Nadu, India, 02 exs, 18.iv.2025, Coll. D. Nagarajan., ZSI Regd. No. MISE/INS/040 and Poongulam (12.4082° N, 78.7249° E), Jawadhu Hill, Tirupathur Dist, Tamil Nadu, India, 05 exs, 19.iv.2025, Coll. D. Nagarajan., ZSI Regd. No. MISE/INS/071.

Diagnosis: Head slightly exposed away from the pronotum, face fully covered with dark patches; anterior vertex area without any markings. Ocelli present; located above to the anterior corner of antennal socket; the distance of the ocelli is less than antennal socket distance. Antenna yellowish brown; simple segmented reaches half of the body. Maxillary pulps yellowish brown; 1st and 2nd pulps are small and 3rd is larger, 4th and 5th are slightly smaller than 3rd pulpi. Front femur Type C1minute hairy spines are arranged in a row and terminating with a big spine. All the femurs are unarmed, but covered minute hairs; all Tibias in all legs armed with spines. Pulvillus present all legs of all tarsal segments without armed, occupy full space in the tarsal segment length. Hind leg first tarsal segment length is equal to the succeeding segment combined. Arolium present, reaches 1/2 of the tarsal claw's length. Tegmina and hind wings are well developed reaches beyond the abdomen.

Geographic distribution: That species is to Native Range of Indomalayan region, including predominant range of distribution and describes it as native to the Sunda Islands of the Malaya Archipelago. Introduced and Established to Western Hemisphere, much of the southeastern United States, numerous tropical and subtropical islands, and various locations in Europe, such as Switzerland and Czechia, often as an introduced species.

Ecological and biological notes: Pycnoscelus surinamensis is a globally widespread cockroach species notable for its parthenogenetic reproduction, which likely contributes to its ability to colonize diverse environments (Bell *et al.* 2007). This species thrives in moist subterranean environments and exhibits rapid population growth in suitable habitats. Its biology is closely linked to environmental humidity, and its ability to reproduce without males significantly enhances its capacity for successful spread and establishment. result, *P. surinamensis* has become a persistent pest in tropical and greenhouse settings where these favorable conditions exist (Revathi *et al.* 2010).

***Pycnoscelus tenebrigera* (Walker 1868)**

Material Examined: Andiyappanur (12.4867° N, 78.7136° E), Jawadhu Hill, Tirupathur Dist, Tamil Nadu, India, 02 exs, 18.iv.2025, Coll. D. Nagarajan., ZSI Regd. No. MISE/INS/056.

Diagnosis: This species can be easily differentiated from other species by the pronotal variation having a fold in each side of the pronotum and the genital phallomeres having a spine like separated L2D and hook modification in the apex of the sub genital plate; right stylus larger these are the unique character for this species can separate from other species.

Geographic distribution: *Pycnoscelus tenebrigera* is a member of the genus *Pycnoscelus,* which likely originated in the Indomalayan region, encompassing modern India and surrounding tropical Asian areas. The genus is believed to have diversified mainly in the tropical zones of Asia, with *Pycnoscelus tenebrigera*

described from India and found naturally in India and Afghanistan. Like most *Pycnoscelus* species, it is not considered invasive and has a restricted, ancestral distribution in the Oriental region.

Family: Blattidae Latreille, 1810
Subfamily: Blattinae
Genus: *Blatta* Linnaeus, 1758

***Blatta orientalis* Linnaeus 1758**

Material Examined: Andiyappanur (12.4867° N, 78.7136° E), Jawadhu Hill, Tirupathur Dist, Tamil Nadu, India, 05 exs, 18.iv.2025, Coll. D. Nagarajan., ZSI Regd. No. MISE/INS/057.

Diagnosis: Adult male and female dark brown, pronotum black without any markings, head protruded away from the pronotum, Antenna blackish brown length equal length to body length. Front femur strongly armed and the hind leg metatarsus 1st tarsomere length is longer than the other segments combined. Tegmina and wings are developed in male; females wingless, tegmina is reduced modified as wing pad, wings are absent hidden under the tegmina. Male tegmina reaches up to the abdominal segment T7, Abdominal tergum dark brown, Anal cerci, and extended beyond the supra-anal plate.

Geographic distribution: *Blatta orientalis,* commonly known as the oriental cockroach, has a cosmopolitan distribution and is found worldwide. The origin of *Blatta orientalis* is believed to be from North Africa, the eastern Mediterranean, and regions around the Black and Caspian Seas, including throughout Europe, Asia, Africa, Australia, New Zealand, North America, and associated islands. the Oriental Cockroach is present in approximately ten per cent of properties in areas all over the world (Cornwell 1968).

Ecological and biological notes: the oriental cockroach, is a large, dark-colored cockroach species with a global distribution. It prefers cool, damp environments such as basements, sewers, and leaf litter. This species is nocturnal, omnivorous, and notorious as a household pest due to its ability to contaminate food and spread diseases (Biswas *et al.* 2018).

Genus: *Neostylopyga* Shelford 1911.

Neostylopyga rhombifolia **(Stoll 1813)**

Material Examined: Andiyappanur (12.4867° N, 78.7136° E), Jawadhu Hill, Tirupathur Dist, Tamil Nadu, India, 09 exs, 18.iv.2025, Coll. D. Nagarajan., ZSI Regd. No. MISE/INS/037 and Melpattu (12.4894° N, 78.5679° E), Jawadhu Hill, Tirupathur Dist, Tamil Nadu, India, 04 exs, 20.iv.2025, Coll. D. Nagarajan., ZSI Regd. No. MISE/INS/058.

Diagnosis: Generally, both male and female are yellowish brown in color, pronotum parabolic shape with irregular white patches. Head not exposed away from the pronotum, face with dark markings in the center, Front femur Type A with 3 spines in the apex of the femur spines are increased in size towards the apex. All tibia and femurs are armed, pulvillus present positioned apical, 1st tarsal segment with a row of spines in the inner side of the tarsi, 1st tarsal segment is longer than other segments combined. Arolium present, tarsal claws simple, symmetrical, unspecialized, Tegmina reduced as wing pad, hind wings absent.

Geographic distribution: *Neostylopyga rhombifolia*, commonly known as the Harlequin cockroach, is believed to be of Asian origin, specifically Southeast Asia or the Indo-Malayan region. It has been recorded in tropical areas including parts of Southern Asia, and is considered a widespread domiciliary pest that has been transported globally. The species has been found in places such as Singapore since as early as 1915, but it is believed not to be native to all the areas where it is currently found, indicating human-mediated spread. Thus, its origin is most likely in tropical Asia (Ma *et al.* 2017).

Ecological and biological notes: The harlequin roach, is a flightless cockroach species with distinctive black and yellow patterns found commonly in human dwellings worldwide. It is omnivorous, feeds on plant materials and household scraps, and produces a strong-smelling chemical defense (amyl acetate) that deters predators. The species undergoes incomplete metamorphosis with about 10 nymphal stages before adulthood. Its mitochondrial genome has been sequenced, aiding phylogenetic studies, and it is considered both a pest and a popular pet due to

its striking coloration (Revathi *et al.* 2011).

***Neostylopyga sexpustulata* (Walker 1871)**

Material Examined: Poongulam (12.4082° N, 78.7249° E), Jawadhu Hill, Tirupathur Dist, Tamil Nadu, India, 03 exs, 19.iv.2025, Coll. D. Nagarajan., ZSI Regd. No. MISE/INS/059.

Diagnosis: Female morphologically brownish, Pronotum sub parabolic in shape, brown in color without any markings, Head protruded away from the pronotum. Metanotum with a pair yellow spot in the lateromid region. Mesonotum no markings, Abdominal tergum brownish, with a pair of yellow spots on the latro corner on 2nd tergum and 6th tergum. Face dark brown, without any ocelli spot, abdominal sternum dark brown. Hind leg with pulvilli in all the tarsal segments, the pulvilli occupy the entire 1st tarsal segment. The 1st tarsomere segment length is equal to remaining segments combined.

Geographic distribution: *Neostylopyga sexpustulata* has distribution primarily in Asia, especially India and surrounding regions. Its recorded presence includes various states in India such as Karnataka, Tamil Nadu, Andhra Pradesh, Uttar Pradesh, Bihar, and Odisha. Outside India, it is also found in Sri Lanka and Java, Indonesia (Princis 1966).

Ecological and biological notes: *Neostylopyga sexpustulata* is a brown to dark brown cockroach with six distinct brown spots on its body. It inhabits forested regions in India, favoring moist, shaded environments such as leaf litter and undergrowth. This species is distributed mainly in the Indian states and indicating a preference for tropical and subtropical climates (Prabakaran and Senraj 2018).

Genus: *Periplaneta* Burmeister 1838

***Periplaneta americana* (Linnaeus 1758)**

Material Examined: Andiyappanur (12.4867° N, 78.7136° E), Jawadhu Hill, Tirupathur Dist, Tamil Nadu, India, 05 exs, 18.iv.2025, Coll. D. Nagarajan., ZSI Regd. No. MISE/INS/044 and Poongulam (12.4082° N, 78.7249° E), Jawadhu Hill, Tirupathur Dist, Tamil Nadu, India, 10 exs, 19.iv.2025, Coll. D. Nagarajan., ZSI Regd. No. MISE/INS/060 and Melpattu (12.4894° N, 78.5679° E), Jawadhu Hill, Tirupathur Dist, Tamil Nadu, India, 05 exs, 20.iv.2025, Coll. D. Nagarajan., ZSI Regd. No. MISE/INS/061.
Diagnosis: Both male and female fully winged, tegmina and hind wings are well developed, Pronotum with white patches seen in the center of the pronotum. Head slightly exposed away from the pronotum, face with black markings in the vertex, ocelli present large, above to the antennal socket, ocelli distance is less than antennal socket distance. Front femur type A terminating with 2-4 spines increased in size towards the apex of the femur, all legs coxa and femur fully spined. Pulvillus present positioned apical to all the tarsal segments, arolium present, tarsal claws are simple, unspecialized.

Geographic distribution: *Periplaneta americana,* commonly known as the American cockroach, is native to Africa and the Middle East but is now established globally due to human activity. It is most common in warm, humid environments and urban areas but can survive in diverse habitats if water is available. Its current distribution spans nearly every continent, with indoor prevalence where outdoor conditions are too cold.

Ecological and biological notes: *Periplaneta americana* is a highly adaptable and prolific urban pest, thriving in warm, moist environments and often invading human dwellings. Its ability to transmit pathogens and trigger allergies makes it a significant public health concern. Effective management is essential to minimize its ecological and medical impact in urban settings.

***Periplaneta australasiae* (Fabricius 1775)**

Material Examined: Poongulam (12.4082° N, 78.7249° E), Jawadhu Hill, Tirupathur Dist, Tamil Nadu, India, 04 exs, 19.iv.2025, Coll. D. Nagarajan., ZSI Regd. No. MISE/INS/062.

Diagnosis: Adult male morphologically brown in color, Tegmina and wings are brown, Pronotum shiny brown without any markings. Pronotum lateral margin anterior corner with yellow patches and posterior edges with yellowish margin. Face brownish,

clypeus yellowish ocelli small positioned to the antennal socket. Head slightly protruded away from the pronotum, Tegmina and wing are well developed extended beyond the abdomen length. Abdominal tergum and sternum brownish, Sub genital plate and sub genital plate slightly dark brown. Front femur Type A, 144 positioned with a row of strong spines and terminating with 2-3 thick epical spines. Genital phallomeres are well developed.

Geographic distribution: *Periplaneta australasiae*, the Australian cockroach, is widely distributed across tropical and subtropical regions worldwide. It likely originated in Africa but now inhabits areas in Asia, Australia, the Americas, and the Pacific. The species thrives in warm, humid environments both outdoors and inside buildings.

Family: Corydiidae Saussure 1864
Subfamily: Corydiinae Saussure 1864
Genus: *Therea* Billberg 1820

***Therea nuptialis* (Gerstaecker 1861)**

Material Examined: Andiyappanur (12.4867° N, 78.7136° E), Jawadhu Hill, Tirupathur Dist, Tamil Nadu, India, 02 exs, 18.iv.2025, Coll. D. Nagarajan., ZSI Regd. No. MISE/INS/038 and Melpattu (12.4894° N, 78.5679° E), Jawadhu Hill, Tirupathur Dist, Tamil Nadu, India, 04 exs, 20.iv.2025, Coll. D. Nagarajan., ZSI Regd. No. MISE/INS/063.

Diagnosis: This species is fully winged, both tegmina and hind wings are well developed, poor in flight, this is the main diagnostic feature for this species can be easily distinguished from other species in this genus. The tegmina reach beyond the abdomen and the hind wing also reaches the length. Interestingly the yellow spot in the tegmina varies and the hind wing dark patches also seen some variations.

Geographic distribution: The species *Therea nuptialis* is known to be distributed in India, particularly in the region of Odisha, is found in the "Fauna of Orissa - Part I," which is part of the State Fauna Series published by the Zoological Survey of India. It is a terrestrial species found on the ground or at low levels in vegetation, typically in lowland and foothill forests and woodlands that range from dry to semi-humid environments.

Remarks: The genus Therea, to which this species belongs, is known to occur mainly in South, East, and Central India and Sri Lanka. The species *Therea nuptialis* is not reported outside India, indicating that it is likely to be endemic to that region. This species plays an important ecological role in nutrient recycling as a generalist feeder and forms part of the food web. Though not extensively studied, the genus Therea is noted for its unique patterns and behavior, with some species popular as pets.

***Therea petiveriana* (Linnaeus 1758)**

Material Examined: Andiyappanur (12.4867° N, 78.7136° E), Jawadhu Hill, Tirupathur Dist, Tamil Nadu, India, 04 exs, 18.iv.2025, Coll. D. Nagarajan., ZSI Regd. No. MISE/INS/039 and Poongulam (12.4082° N, 78.7249° E), Jawadhu Hill, Tirupathur Dist, Tamil Nadu, India, 09 exs, 19.iv.2025, Coll. D. Nagarajan., ZSI Regd. No. MISE/INS/064 and Melpattu (12.4894° N, 78.5679° E), Jawadhu Hill, Tirupathur Dist, Tamil Nadu, India, 02 exs, 20.iv.2025, Coll. D. Nagarajan., ZSI Regd. No. MISE/INS/065.

Diagnosis: This species was easily differentiated from other species by hind wing variation. The hind wings with dark patches arise from apex of the cubitus and medial vein extended upto anal vein region. This is unique character for differentiate this species in morphologically.

Geographic distribution: The origin of *Therea petiveriana,* commonly known as the Indian domino cockroach, is primarily distributed in southern India, particularly in Tamil Nadu (including the Coimbatore and Vellaiyangiri hills) and Pondicherry. It is endemic to India, with no natural populations reported outside this region. The species typically inhabits scrub forest habitats, living on the ground where it burrows under leaf litter or loose soil to avoid heat (Prabakaran and Senraj 2018).

***Therea regularis* Grandcolas 1993**

Material Examined: Melpattu (12.4894° N,

78.5679° E), Jawadhu Hill, Tirupathur Dist, Tamil Nadu, India, 02 exs, 20.iv.2025, Coll. D. Nagarajan., ZSI Regd. No. MISE/INS/066.

Diagnosis: This species is very much closer to *Therea petiveriana* (Linnaeus 1758) and *Therea defrancesch*i Grandcolas 1993, and it was easily differentiated from other species by hind wing variation. The hind wings with dark patches arise from apex of the cubitus and reaches upto cubitus vein region. This is unique character for differentiate this species in morphologically.

Geographic distribution: *Therea regularis i*s a species mainly found in India and Sri Lanka, inhabiting lowland and foothill forests with dry to semi-humid conditions. It lives close to the ground or on low vegetation and is known for its distinctive black and white patterned appearance. The species is popular among insect enthusiasts and is sometimes kept as a pet due to its striking look.

Family: Ectobiidae Brunner von Wattenwyl, 1865
Subfamily: Blattellinae
Genus: *Blattella* Caudell 1903

***Blattella biligata* (Walker 1868)**

Material Examined: Andiyappanur (12.4867° N, 78.7136° E), Jawadhu Hill, Tirupathur Dist, Tamil Nadu, India, 03 exs, 18.iv.2025, Coll. D. Nagarajan., ZSI Regd. No. MISE/INS/067.

Diagnosis: Normally these groups are dull in color, fore wings and hind wings are well developed, first abdominal tergites (T1) are always unspecialized, tergites 7 (T7) or tergite 7 (T7) and 8 (T8) having specialized tergal glands. Front femur arrangement always types A and most of the species terminating with 3 big spines that are arranged in increased length towards the tip of the femur. Pulvillus present in all the tarsal segments of all legs, tarsal claws are simple and unspecialized arolium present.

Geographic distribution: *Blattella biligata* is widely distributed across India (including Karnataka, Meghalaya, West Bengal, Tripura, Arunachal Pradesh, Tamil Nadu), as well as in Sri Lanka, Pakistan, Kenya, Israel, Mozambique, and other parts of Africa and the Middle East. It is considered a cosmopolitan species found throughout the Oriental region and parts of Africa and the Middle East.

Ecological and biological notes: *Blattella biligata* is typically found in warm, humid environments often associated with human dwellings. It is an opportunistic omnivore that feeds on a variety of organic materials. The species thrives in diverse habitats in tropical and subtropical regions.

***Blattella germanica* (Linnaeus 1767)**

Material Examined: Andiyappanur (12.4867° N, 78.7136° E), Jawadhu Hill, Tirupathur Dist, Tamil Nadu, India, 07 exs, 18.iv.2025, Coll. D. Nagarajan., ZSI Regd. No. MISE/INS/043 and Poongulam (12.4082° N, 78.7249° E), Jawadhu Hill, Tirupathur Dist, Tamil Nadu, India, 04 exs, 19.iv.2025, Coll. D. Nagarajan., ZSI Regd. No. MISE/INS/068 and Melpattu (12.4894° N, 78.5679° E), Jawadhu Hill, Tirupathur Dist, Tamil Nadu, India, 10 exs, 20.iv.2025, Coll. D. Nagarajan., ZSI Regd. No. MISE/INS/069.

Diagnosis: The *Blattella germanica* is easily differentiated by morphologically by the anal stylus located in the apical of the sub genital plate and right-side stylus very tiny compare to left side stylus. Abdominal 7th and 8th tergum having some modifications.

Geographic distribution: The German cockroach (*Blattella germanica*) is native to North Africa, specifically Ethiopia and Sudan, although it was previously thought to have originated from South Asia or Southeast Asia (Tang *et al.* 2024). It has since spread worldwide and is now one of the most widespread cockroach species globally due to human activity and commerce. It occurs widely in warm, humid environments, typically inhabits human structures such as homes, restaurants, ships, and hospitals, and is unable to survive long away from human environments or in cold temperatures.

Ecological and biological notes: *Blattella germanica,* the German cockroach, is a small, light brown insect about 11 - 16 mm long that undergoes incomplete metamorphosis with egg, nymph, and adult stages. Females carry egg cases containing 30 - 40 eggs.

The species is omnivorous and exhibits aggregation behavior. It is highly adapted to warm, humid indoor environments such as kitchens and bathrooms, thriving near food and water sources. Populations grow rapidly due to continuous breeding, and the species is a significant urban pest and vector of pathogens.

***Blattella humbertiana* (Saussure 1863)**

Material Examined: Andiyappanur (12.4867° N, 78.7136° E), Jawadhu Hill, Tirupathur Dist, Tamil Nadu, India, 11 exs, 18.iv.2025, Coll. D. Nagarajan., ZSI Regd. No. MISE/INS/070 and Melpattu (12.4894° N, 78.5679° E), Jawadhu Hill, Tirupathur Dist, Tamil Nadu, India, 05 exs, 20.iv.2025, Coll. D. Nagarajan., ZSI Regd. No. MISE/INS/072.

Diagnosis: This species can be easily separated from other species in this genus by the sub-genital plate arrangement and the anal cerci. The anal cerci sharp and closely attached with sub genital plate positioned latero-caudal region and the tergum T7 having the modification.

Geographic distribution: *Blattella humbertiana* is primarily distributed in India, especially in Tamil Nadu (Vellaiyangiri hills and Chennai), Maharashtra, and West Bengal. The species is also found in circutropical regions beyond India. It inhabits diverse environments, frequently associating with human dwellings.

Ecological and biological notes: *Blattella humbertiana,* commonly known as the brown-banded cockroach, typically inhabits warm indoor environments with a preference for drier microhabitats compared to other cockroach species. It is an omnivorous scavenger feeding on a variety of organic matter, including food scraps and decaying material. The species undergoes seven to nine nymphal stages, with reproduction and life cycle adaptations suited to indoor settings, making it a prevalent household pest in tropical and subtropical areas (Prabakaran 2010).

***Blattella vaga* Hebard 1935**

Material Examined: Andiyappanur (12.4867° N, 78.7136° E), Jawadhu Hill, Tirupathur Dist, Tamil Nadu, India, 01 exs, 18.iv.2025, Coll. D. Nagarajan., ZSI Regd. No. MISE/INS/073.

Diagnosis: Head with a blackish brown band from the eyes to the mouth parts, pronotum parabolic in shape, middle with a pair of black bands and the pronotal margin hyaline, head covered by pronotum. Tegmina and wings are well developed extended beyond the abdomen. T7 with modification, its anterior half with a deep, median elliptical fossa T8 unmodified. Subgenital trigonal, with a pair of equal apex styles positioned unevenly. Genital phallomere well developed, genital hook with subapical incision.

Geographic distribution: *Blattella vaga,* known as the field cockroach, is native to Central Asia and has spread across parts of the southern United States, following major interstate highways. It is also found in Europe, Northern Asia, Central America, North America, and Southern Asia.

Subfamily: *Pseudophyllodromiinae* Hebard, 1929
Genus: *Allacta* Saussure and Zehntner 1895

***Allacta figurata* (Walker 1871)**

Material Examined: Poongulam (12.4082° N, 78.7249° E), Jawadhu Hill, Tirupathur Dist, Tamil Nadu, India, 02 exs, 19.iv.2025, Coll. D. Nagarajan., ZSI Regd. No. MISE/INS/074.

Diagnosis: Pronotum sub parabolic in shape with large pale central circle shaped macula with dark brown border starting from anterior to posterior pronotal margin was haline. Tegmina and hind wing fully developed, extending beyond the end of the abdomen.

Geographic distribution: *Allacta figurata* is found mainly in the Indian subcontinent, with its type locality in Bombay (Mumbai), India. It inhabits tropical regions within India and is part of a genus whose species spread across Southeast Asia and Australia. The species confirmed range centers on tropical India.

Ecological and biological notes: *Allacta figurata* lives in forest leaf litter and sometimes climbs trees, but is neither a burrower nor a borer. It walks or climbs on tiptoe due to reduced pulvilli, which are

present only on the fourth tarsomere. Its ecological niche centres on ground litter foraging in tropical habitats (He *et al.* 2019).

Genus: *Balta* Tepper 1893.
***Balta reticulata* (Fabricius 1798)**

Material Examined: Poongulam (12.4082° N, 78.7249° E), Jawadhu Hill, Tirupathur Dist, Tamil Nadu, India, 01 exs, 19.iv.2025, Coll. D. Nagarajan., ZSI Regd. No. MISE/INS/075.

Diagnosis: Adult female face with yellowish indistinct band, ocelli simple and visible, Maxillary pulp with 4th is much shorter than 2nd and 3rd pulb equal to 5th pulpi, Pronotum reddish-brown in the center and the lateral corners hyaline, Abdomen yellowish brown, supra anal plate punctured with brown patches, Supra anal plate triangular but it not notched at apex. Anal cerci long, tegmina and wings are well developed extended beyond the abdomen. The main species differentiating character is maxillary pulb.

Geographic distribution: *Balta reticulata* is primarily distributed in India. According to available records, it has not been reported from any other country, suggesting it is likely endemic or restricted to India.

Genus: *Supella* Shelford 1911.

***Supella longipalpa* Fabricius 1798**

Material Examined: Andiyappanur (12.4867° N, 78.7136° E), Jawadhu Hill, Tirupathur Dist, Tamil Nadu, India, 04 exs, 18.iv.2025, Coll. D. Nagarajan., ZSI Regd. No. MISE/INS/042 and Poongulam (12.4082° N, 78.7249° E), Jawadhu Hill, Tirupathur Dist, Tamil Nadu, India, 02 exs, 19.iv.2025, Coll. D. Nagarajan., ZSI Regd. No. MISE/INS/076.

Diagnosis: This species male and females are dull in color, males are fully winged and able to fly, females are brachypterous. Pronotum sub paraphobia in shape without any marking, head slightly exposed away from the pronotum, Ocelli present, located above to the antennal socket, the distance of the ocelli is less than antennal socket distance. Femoral arrangements type A terminating 2 spines in the tip of the femur. Pulvillus present on all tarsal segment positioned apical covered with spines in the lateral edges, arolium present, tarsal claws simples similar and unspecialized. Abdominal tergum T7 modified as oval shaped depression and covered with dense setae.

Geographic distribution: *Supella longipalpa*, the brown-banded cockroach, is native to Africa and now has a widespread global distribution. It is commonly found in the United States, Britain, Ireland, and parts of Asia, including India and Taiwan.

Ecological and biological notes: *Supella longipalpa* is a small cockroach species about 10 to 14 mm long, recognized by light brown bands on its wings and abdomen. It prefers warmer, drier indoor environments such as living rooms and bedrooms and is often found hiding in higher, less accessible places like shelves and behind picture frames. This species is omnivorous, capable of feeding on a variety of organic materials, and acts as a vector for pathogens and allergens affecting humans (Nasirian 2016).

Cockroach species distribution across families showed that the *Blaberidae* family, which included seven species, six genera, and four subfamilies, clear-

Table 1. List of Exotic cockroach species in Jawadhu Hills, Tirupathur District, Tamil Nadu.

Sl. No.	Species	Origin	Reference
1	*Pycnoscelus surinamensi*s (Linnaeus 1758)	Indomalayan region (Indo-Pacific realm)	(Shabnam and Dinesh 2022)
2	*Blatta orientalis Linnaeu*s, 1758	Eastern Europe and Western Asia	(Marshall *et al.* 1988, Ragge 1965)
3	*Periplaneta americana* (Linnaeus 1758)	Africa and Middle East	(Bell and Adiyodi 1981)
4	*Blattella germanica* (Linnaeus 1767)	South Asia or Southeast Asia	(Tang *et al.* 2024)
5	*Supella longipalpa* Fabricius, 1798	Nile Valley region of Africa	(Nasirian 2016)

ly dominated the field. The family *Blattidae,* which had one subfamily, one genus, and four species, the family *Ectobiidae,* which had two subfamilies, three genera, and seven species; and the family *Corydiidae,* which had one subfamily, one genus, and three species, came next. The Andiyappanur region had the most species richness in terms of habitat, with *Blattella* and *Therea* being especially prevalent, while the Melpattu region had the lowest diversity, indicating a very small cockroach assemblage. Three endemic species and five exotic species (Table 1) (*Pycnoscelus surinamensis, Blatta orientalis, Periplaneta americana, Blattella germanica,* and *Supella longipalpa*) were also identified in this study, highlighting the ecological distinctiveness of the native fauna as well as the possible effects of invasive taxa. These results emphasize the necessity of additional ecological evaluations to clarify the functional functions of alien and endemic cockroaches in regional ecosystems.

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