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APPENDICES

ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย

TAXONOMIC INFORMATION OF ANTS IN PUBLIC PARKS

Subfamily Ponerinae

This subfamily is distinguished from the other subfamilies by the 1-segmented waist, distinct constriction between the gastral segments 1 and 2 (except in the genera *Odontomachus* and *Anochetus*), simple pygidium which has not a row of denticles, and the presence of functional sting.

Many species are carnivorous, and form a relatively small colony consisting of tens to hundreds of adults. The sting is painful in some species. Size difference between workers and females is not distinct. Generally, males and females are winged, with two cubital cells in forewing. Rarely wingless forms and queenless species are found (Yamane et al., 1998).

Ponerinae comprise about 1300 species in 42 genera, and are thriving in the tropics. In this study, ponerines were found 3 genera 4 species, *Anochetus graffeii*, *Diacamma vagans*, *D. rugosum*, and *Odontomachus simillimus*.

Genus *Odontomachus* Latreille, 1804

Large ants. Mandible characteristically long and linear; its tip abruptly curved inward. The shaft of mandible inserted in the middle of anterior margin of head. Antenna long. Eye developed situated anterior and relative dorsally on the head. Nuchal carinae converging in a V at midline and connected to the median longitudinal line. Anterior margin of gastral tergum 2 is without constriction. This genus comprises about 55 species, and distributed in the tropical and sub tropical areas around the world.

Genus *Anochetus* Mayr, 1861

Small to medium-sized species. General shape of mandible as in *Odontomachus*, long and linear, and the tip abruptly curve inward. The shaft of mandible inserted in the middle of anterior margin of head. The genus is distinguished from *Odontomachus* by the nuchal carinae, which do not converge in a V at midline and absence of median longitudinal line on head. Anterior margin of gastral tergum 2 constricted on not. The genus comprises about 90 described species in the tropical and subtropical areas around the world.

Genus *Diacamma* Mayr, 1862

Head in full face view oval, with triangular anterior clypeal margin. Eye large and developed. Petiole large, with a pair of teeth posterodorsally. Head, alitrunk, and gaster covered with linear or circular strong striae.

Colony has no winged queen, but has ergatoid queen. The genus contains about 20 species with many subspecies, distributed in the Oriental and Australian regions.

Subfamily Cerapachyinae

This subfamily comprises about 200 described species in genera, most being distributed in the tropical and subtropical areas. They are slender ants, and are distinguished from the other subfamilies by the possession of pygidium with a row of spines or denticles, and the presence of process in the lateral portion of anterior clypeal margin. Waist 1-segmented or 2-segmented. These are carnivorous ants, and feed on other ants or termites (Yamane et al., 1998).

Genus *Cerapachys* F. Smith, 1857

This is the largest genus in this subfamily, consists of about 140 species, and mainly distributed in the tropics and subtropics.

Subfamily Pseudomyrmecinae

This subfamily is distinguished from the other subfamilies by the pectinated tarsal claws, the large eyes, and the posterior margin of clypeus, which is straight, not concave medially. Many of the Asian species are easily recognized by the slender petiole. The phylogenetical position of this subfamily is not clear, and several hypotheses are presented.

Many species are arboreal, and nests are found in hollows of plants. Some species engage in mutualism with specific plant species. This subfamily comprises about 200 species in 3 genera, and distributed in the tropical and subtropical areas (Yamane et al., 1998).

Genus *Tetraoponera* F. Smith, 1852

This genus is easily separated from the other ant genera by developed eyes, 2-segmented waist, and slender body proportion.

Subfamily Myrmicinae

Compound eyes sometimes extremely reduced, but present except in few genera. Frontral lobe generally covers antennal insertion. Antenna consists of 4 to 12 segments and variable also in shape. Waist consists of 2 segments (petiole and postpetiole). Gaster is with or without a sting.

This subfamily has the largest number of genera (156 genera in 1998), and is most diverse in morphology and biology in the Formicidae. About 4400 species are record around the world (Yamane et al., 1998).

Genus *Pheidole* Westwood, 1841

Workers are dimorphic, with minor workers and major workers or soldiers. These ants often form distinct trails from the nest to foraging sites, and often come into houses. Judging from its wide geographical distribution, abundant species number, and big biomass, it is the one of the most thriving ant genera such as *Camponotus* and *Crematogaster*.

This genus comprises about 550 describe species, with the largest species number in tropics and subtropics. The actual number of species in the world would be twice the number of described species.

Genus *Cardiocondyla* Emery, 1869

They are small and slender ants, which have total length less than 3.5 mm. in the workers. Eye relatively developed. Antenna consists of 12 segments (11 segments in a few foreign species); apical 3 segments forming a club. Dorsa of head and alitrunk without hairs. Petiole with subpetiolar process; petiolar peduncle usually long. Postpetiole flat, wider than long in dorsal view. Many species inhabit open sites such as grasslands and bare areas.

This genus comprises about 40 species, and is distributed in the Old World tropics and subtropics. All the records from the New World are based upon human introductions.

Cardiocondyla nuda Mayr, 1866

Total length 2 mm. Body black to blackish brown; alitrunk often slightly paler than head and gaster. Antenna and legs brown. Antennal scape reaching posterior margin of head in full face view. Propodeal spine triangular; posterior corner of propodeum forming about a right angle. Petiole with a long peduncle and a reversed U-shaped node.

This species prefers dry habitats such as open lands and seashores, and nests in the soil or under stones. Males have 3 types of ergatoid, alate male being not discovered, Chromosome number: $2n=28$.

Widely distributed from warm part of eastern Asia through In Japan known from Honshu (Kanto district and southward), Shikoku, Kyushu, the Ogasawara and the Nansei Islands. This species is regarded as native to Africa, and has spread its range by human commerce.

Genus *Tetramorium* Mayr, 1855

Small to medium-sized ants; total length 2-4 mm. Antenna consisting of 11 or 12 segments; apical 3 segments forming a club. Mandible trinagular: apical 3 teeth larger than the rest. Eye moderately large. Anterior portion of antennal scrobe carinate. Promesonotal dorsum flat in profile. Propodeal spine usually developed (absent in a few species). Propodeal spiracle situated behind the line which connects the apex and base of propodeal spine and extended ventrally.

Tetramorium bicarinatum Nylander, 1846

Total length around 3 mm. Bicolored species: head to postpetiole yellow, and gaster dark brown to almost black. Anterior margin of clypeus convex. Erect hairs on frontal carina short, shorter than maximum width of eye. Propodeal spine long. Needle-shaped; its tip beyond the level of propodeal lobe. Petiolar node not higher in posterior portion than in anterior portion in profile. Dorsum of postpetiole in dorsal view oval or narrowed anteriorly.

This species inhabits open sites such as grass-lands, bare areas or crop fields. Widely distributed in the tropics and subtropics in the world excluding Africa.

Tetramorium lanuginosum Mayr, 1870

Total length 2.5 mm. Yellowish brown to red-dish brown. Anterior margin of clypeus concave medially. Propodeal spine long, needle-shaped, curved upward; its tip exceeding the level of propodeal lobe. Posterodorsal margin of petiolar node not forming an angle, gently declivous in profile. Body with abundant hairs; hairs on dorsa of head to petiole including bi- or trifurcate ones.

This species inhabits open sites, and nests under stones or rotten wood. Widely distributed in South East Asia.

Tetramorium simillimum F. Smith. 1851

Total length 2.5 mm. Head to postpetiole yellow to yellowish brown; gaster blackish brown. Anterior margin of clypeus not concave medially. Sides of mesonotum produced laterally in dorsal view. Propodeal spine short, tooth-shaped. not reaching the level of metanotal lobe in profile. Dorsum of alitrunk with sparse short erect hairs. Which are truncated apically. Widely distributed in the tropical and subtropical areas in the world.

Tetramorium smithi Mayr, 1878

Total length 2 mm. Body yellowish brown to reddish brown; gaster dark brown. Among the Japanese species of *Tetramorium*, only this species has 11-segmented antenna. Anterior margin of clypeus not concave medially. Propodeal spine long, needle-shaped, and directed backward; its tip exceeding the level of metanotal lobe in profile. Posterodorsal corner of petiolar node angulate. Dorsum of postpetiole rectangular, with subparallel sides in dorsal view.

This species lives in relatively open and sunny sites. Widely distributed from South East Asia, India to Sri Lanka.

Genus *Monomorium* Mayr, 1855

Small and slender ants; total length less than 4 mm. Mandible with 3-5 teeth. Clypeus with a more or less produced anterior margin, and a distinct median seta. Antenna consisting usually of 12 segments (11, or 10 segments in a few foreign species); apical 3 segments forming a club. Propodeum without posterodorsal teeth. Sub-petiolar process small or obscure.

Monomorium chinense Santschi, 1925

Total length 1.5 mm. Body concolorous dark brown to black. Eye consisting of more than 10 facets. Ventral margin of petiole convex. Body surface smooth and shining, without sculpture.

This species inhabits dry areas such as grasslands and forest edges, and nests in the soil.

Monomorium destructor Jerdon, 1851

Total length 3-3.5 mm; large species for this genus. Body yellowish to reddish brown; gaster blackish brown. Eye large, consisting of about 20 facets. Mandible with 4 teeth. Metanotal groove deeply incised dorsally. Propodeum with transverse rugae running from lateral to declivous face. Widely distributed in the tropics and subtropics of the world.

Monomorium floricola Jerdon, 1851

Total length 1.5 mm. Bicolorous, with the head and gaster brown to blackish brown. And alitrunk light brown. Eye consisting of about 10 facets. Ventral margin of petiole almost straight. Body surface smooth and shining.

This species nests under the bark or in the dead twigs of trees in relatively open sites. Widely distributed in the tropical and subtropical areas of the world.

Monomorium sechellense Emery, 1894

Total length 1.5 mm. Body yellow to yellowish brown. Eye small, consisting of 1-2 facets. Metanotal groove distinctly incised. Posterodorsal margin of propodeum angulate. Ventral margin of petiole convex.

Monomorium pharaonis Linnaeus, 1758

Total length 2-2.5 mm. Body yellow to yellowish brown. Eye large, consisting of 20 facets. Metanotal groove distinctly incised dorsally. Posterodorsal margin of propodeum slightly angulate. Ventral margin of petiole almost straight. Head and alitrunk micropunctate and opaque.

This species is polygenous, and the colony reproduces by budding. It is worldwide species and well known as a house pest. On the mainland Japan it can nest only in buildings with heating facilities.

Genus *Solenopsis* Westwood, 1841

Solenopsis species are monomorphic or polymorphic, body size varying from 1 to 10 mm. Antenna consisting of 10 segments; apical 2 segments forming a club. Clypeus with a pair of longitudinal carina, and a long median seta. Metanotal groove distinct. Propodeum without posterodorsal teeth.

Solenopsis geminata Fabricius, 1804

Total length 3-5 mm; worker caste strongly polymorphic. Body reddish brown; head brown. Major: mandible robust, with 4 bunt teeth (teeth sometime indistinct). Eye consisting of more than 20 facets. Vertex often with a median ocellus. Minor: mandible with 4 distinct teeth. Antennal scape reaching posterior margin of head in full face view. Posterolateral corner of propodeum carinate; the carina extending to dorsal surface of propodeum.

Some species including *S.geminata* are called 'fire ants', and are serious agricultural and nuisance pests on the American continents. *S.geminata* nests in the soil in bare lands, grasslands, etc. It has been known from the tropical and subtropical countries all over the world, including the Philippines and Taiwan near Japan. It might has been originated from Central America or the southern United States, and then extended its range with the help of human activities.

Genus *Pheidologeton* Mayr, 1862

Total length 2-15 mm. Worker caste strongly polymorphic. Antenna 11-segmented; apical 2 segments forming a club. Mandible with 5 of 6 teeth (Obscure in the major worker). Eye relatively small. Pro- and mesonotal

dorsa of minors convex; metanotal groove distinct; propodeum with spines. Subpetiolar process absent. Largest major with ocelli, axilla, and metanotum.

Pheidologeton comprises around 45 described species, and is distributed in the tropics of Africa to South East Asia and Australia.

Pheidologeton diversus Jerdon, 1851

Total length around 2.5 mm in the smallest minor, and exceeding 8 mm in the largest major. Body yellowish brown to reddish brown in the minor and reddish brown to blackish brown in the major.

There are many intermediate forms between the smallest and largest workers. The head of the largest major maybe nearly 10 times as large as that of the smallest minor, and in dry weight more than 500- times difference is said to exist.

P.diversus forms large colonies, often found in the soil or under stones. The colony regularly has long foraging trails. *P.diversus* has widely distributed from Taiwan, South East Asia to India.

Genus *Crematogaster* Lund, 1831

Small to medium- sized ants. It is separated from the other myrmicinae genera by the postpetiole which is connected to dorsal face of gaster, and large propodeal spiracles positioned over the posterior face of propodeum, Antenna consisting of 11 segments (10 in a few species). The Japanese species are divide into 2 subgensra; Subgenus *Orthocrema* which has 2-segmented antennal club, and subgenus *Crematogaster* which has 3-segmented antennal club.

This is one of the most thriving and widespread ant genera, comprises about 430 described species. Particular in the canopy of tropical and subtropical forests, they have a large biomass. Some species nests in the soil of under stones.

Genus *Strumigenys* F. Smith, 1860

Small ants; total length less than 4 mm. Mandible very long, shaft-shaped. Apical portion of mandible forked; usually intercalary teeth present. Subapical portion of mandible with 1-2 teeth in many species. Eye located under antennal scrobe. Antenna consisting of 6 segments. Petiole and postpetiole with spongiform appendages.

Ants of this genus inhabit forest floor, and hunt and feed on collembolans. This genus comprises about 170 described species in the

world, especially abundant in species number in the tropical and subtropical areas.

Genus *Smithistruma* Brown, 1948

Small ants; total length 1-3 mm. Head triangular, with strongly concave posterior margin in full face view. Mandible subtriangular, with many acute teeth. Antenna consisting of 6 segments. Petiole and postpetiole each with spongiform appendages.

Many species live in leaf litter or soil, and hunt collembolans, or diplurans, etc.

This genus comprises about 100 species distributed from the tropics to temperate zones of the world excluding Australian region.

Subfamily Dolichoderinae

In the worker, eye usually developed but ocelli almost always absent. Antenna generally 12-segmented, but rarely 11- or 10-segmented. Abdominal waist 1-segmented, varying in the shape from nodiform, scale-like to tubular. Gastral segment 2 without anterior secondary constriction. Gastral tip with a slit-like opening not surrounded by a fringe of hairs. Sting absent. Dolichoderinae resemble Formicinae species in general appearance, but distinguished therefrom by the shape of opening at the tip of gaster.

Workers are generally epigaenic. Nests are found in the soil, under stone or dead wood and so on in a few species. But many are arboreal, nesting in hollows of twigs or trunks, or under bark of trees. Some have a specific relation to certain plants, utilizing plant cavities as nest sites.

This subfamily comprises about 550 species in 22 genera, mostly found in the tropical and subtropical regions of the world, and a few in the temperate and subarctic regions (Yamane et al., 1998).

Genus *Tapinoma* Förster, 1850

Small-sized in many species; worker body length 1.5-5 mm. Eye moderate in size, and situated in the middle or slightly anteriorly on head. Metanotal groove distinct. Dorsal face of propodeum short. Petiole tube-shaped, and hidden under gastral segment 1. Only four segments are recognized when the gaster is seen from above. About sixty species are recorded in the world.

Tapinoma melanocephalum Fabricius, 1793

Small species; total length 1.5 mm. Body bicolored, brown and pale yellow; antennal flagellum, sides of pro- and mesothorax, propodeum and

gaster brown; mandible, antennal scape, dorsa of pro- and mesothorax and legs pale yellow. Antennal scape exceeding posterior margin of head. Eye large, with 9-10 facets in the longest row.

Nests are made in the soil, and under the bark of trees or stones. Colonies are polygynous. Workers run very quickly. This species is a house pest in the tropics.

Widely distributed in the tropics and subtropics of the world.

Subfamily Formicinae

Waist 1-segmented; sting absent at gastral apex. Apical segment of gaster conical with a rounded opening usually surrounded by a fringe of hairs. Frons generally well defined. Eye usually developed, but rarely reduced or absent. Ocelli present in workers of several genera. General shape of female (queen) like that of worker, but usually larger and with well-developed alitrunk. Male always is alate.

Workers of many species are found foraging on the ground and attract attention. Many species feed on honeydew of plants or homopterans and omnivorous, but some perform slavery or temporal social parasitism.

This is a large group consisting of about 2500 species in 49 genera around the world (Yamane et al., 1998).

Genus *Anoplolepis* Santschi, 1914

Medium-sized ants, with developed eye and long antennal scapes which are far beyond posterior margin of head. Antenna consisting of 11 segments; funicular segments each longer than wide. Metanotal groove not visible. Metanotum small, not distinctly separable from mesonotum. Legs slender.

This genus comprises 22 species, distributed mostly in Africa. A single species, *A. gracilipes*, has been known to occur in South East Asia.

***Anoplolepis gracilipes* F. Smith, 1857**

Total length 4 mm. Body yellow; gaster much darker. Head oval; anterior margin of clypeus convex, Mandible with 8 teeth. Antenna and legs slender and long; antennal scape exceeding posterior margin of head by more than half its length; funicular segments each more than 3 times as long as wide. Alitrunk elongate; prothorax produced anteriorly.

This species nests in the soil or under stones, and commonly found in grasslands, at forest edges and roadsides. It is also seen frequently foraging on tree trunks. It is considered to have spread over the world through human activities. Widely distributed in the tropics and subtropics of the world.

Genus *Paratrechina* Motschoulsky, 1863

Small ants; total length around 1.5-3.5 mm. Eye moderate in size, and positioned relatively forward on head. Antenna consisting of 12 segments. Mandible with 5 or 6 teeth.

Paratrechina longicornis Latreille, 1802

Total length 2.5 - 3 mm. Body brown to black. Antennal scape long, exceeding posterior margin of head by more than its half length. Mandible with 5 teeth. Alitrunk slender; pronotal dorsum with several erect hairs; mesonotal dorsum with 3 pairs of erect hairs; propodeal dorsum without hairs. Hind trochanter and femur with suberect hairs.

Commonly found in dry habitats as in grasslands and at roadsides. The workers are agile and often enter houses.

Widely distributed in the tropics of the world.

Genus *Camponotus* Mayr, 1861

Medium to large sized ants: total length of worker ranging from 2.5 mm to over 25 mm; most are over 4 mm long. Eye large; ocelli absent in the worker. Antennal insertion well separated from posterior margin of clypeus. Antenna 12-segments. Dorsal outline of alitrunk evenly arched in profile in at least the Japanese species. Petiole with a thick scale, without spines or teeth. Metapleural gland orifice absent. In many species worker size quite variable. In some species, the worker caste with two morphologically distinct subcastes, larger one often being called soldier. This genus has been divided into many subgenera, whose boundary is often unclear.

Nesting habits vary from subterranean to arboreal.

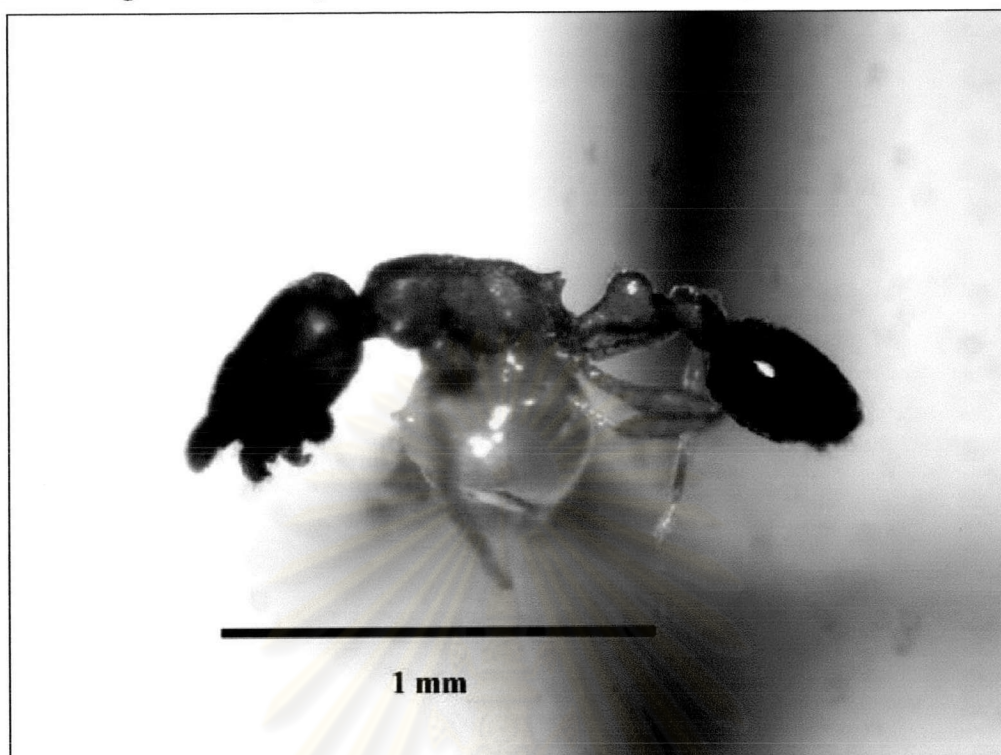
Camponotus includes around 600 described species. It is widely distributed from the tropics to cool temperate regions of the world.

Genus *Polyrhachis* F. Smith, 1857

Medium to large sized ants: total length 5-10 mm. Eye developed; ocelli absent in the worker. Antenna 12-segmented; antennal insertion situated far from posterior margin of clypeus. Alitrunk often with spines on pronotum, mesonotum and/or propodeum. Petiole armed with spines or teeth. Gastral tergum 1 well developed, in dorsal view longer than exposed parts of the following terga together. Opening at gastral apex lacking a radial fringe of hairs.

The genus comprises about 480 described species and is distributed mostly in tropical and subtropical areas, excluding those of the New World. It is the second largest genus next to *Camponotus* within this subfamily.

Appendix Figure 1: Ant species that found in this study

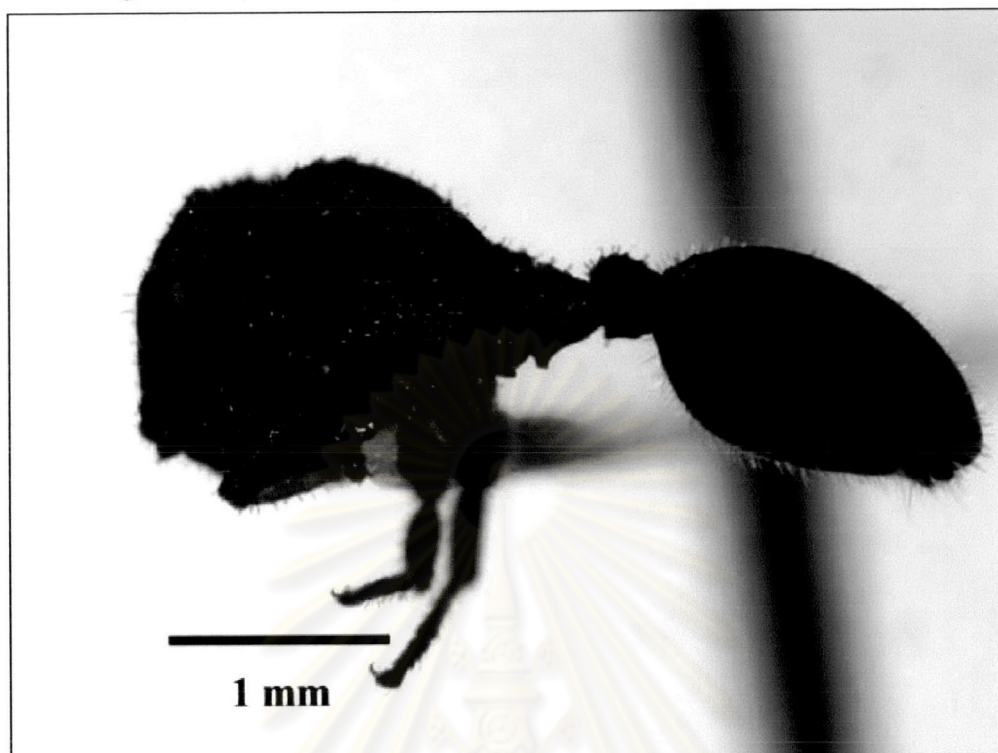


A-1: *Cardiocondyla emeryi*

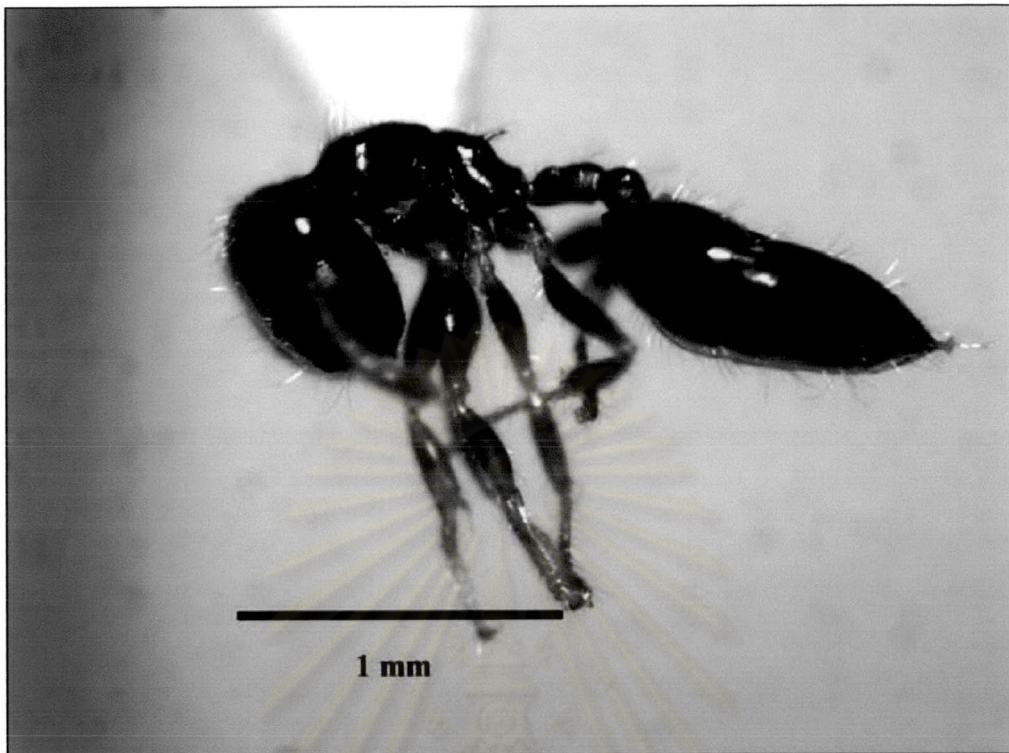


A-2: *Cardiocondyla nuda*

Appendix Figure 1: (continued)

*A-3: Catalacus granulatus**A-4: Crematogaster rogenhoferi*

Appendix Figure 1: (continued)

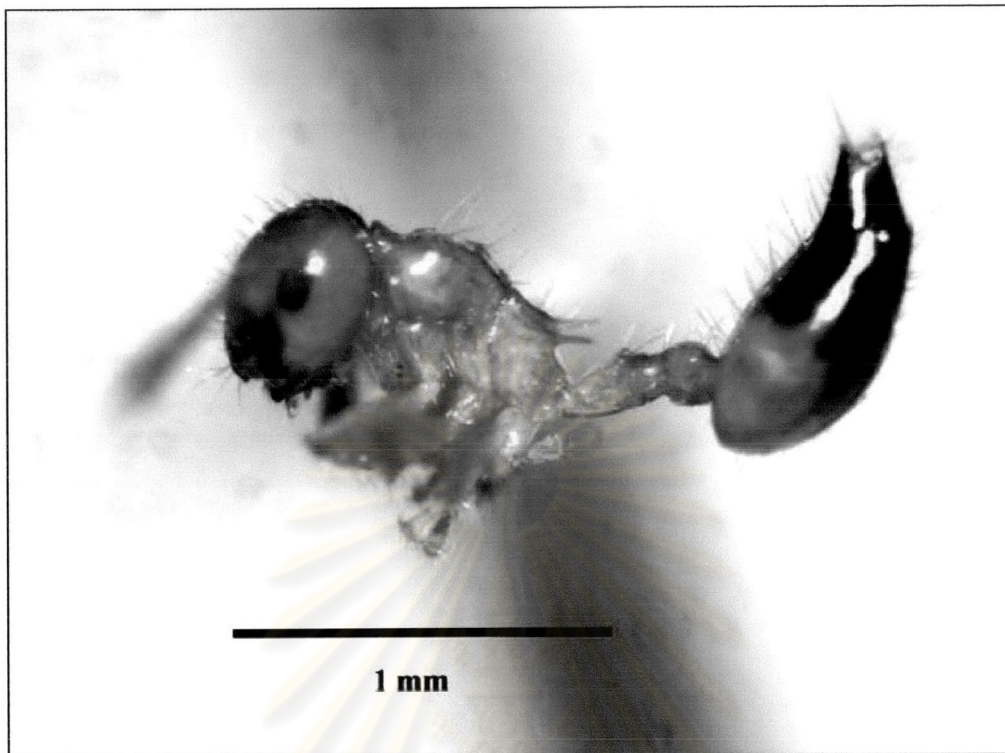


A-5: *Crematogaster* sp.3 of AMK

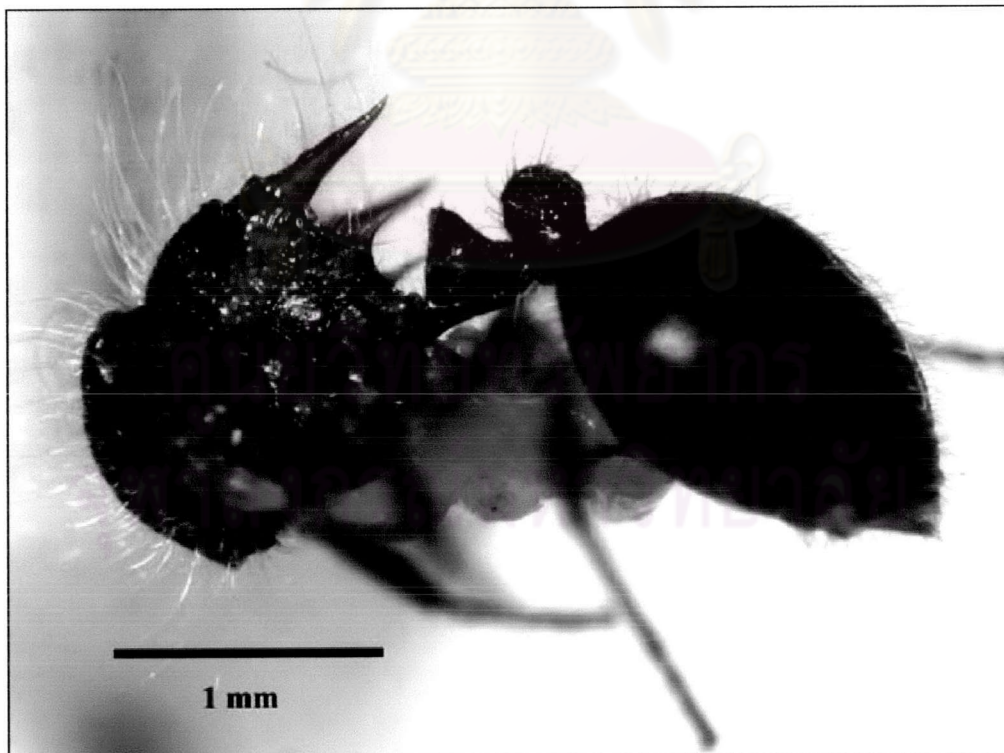


A-6: *Crematogaster* sp.9 of AMK

Appendix Figure 1: (continued)

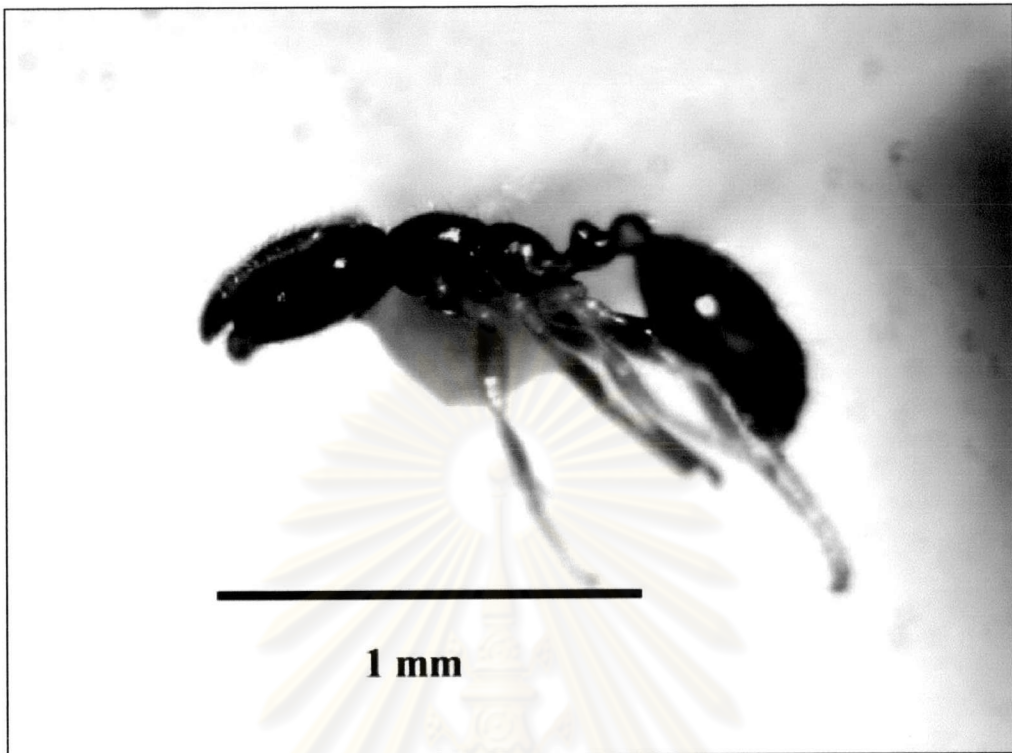


A-7: *Crematogaster (Orthocrema) sp.1* of AMK

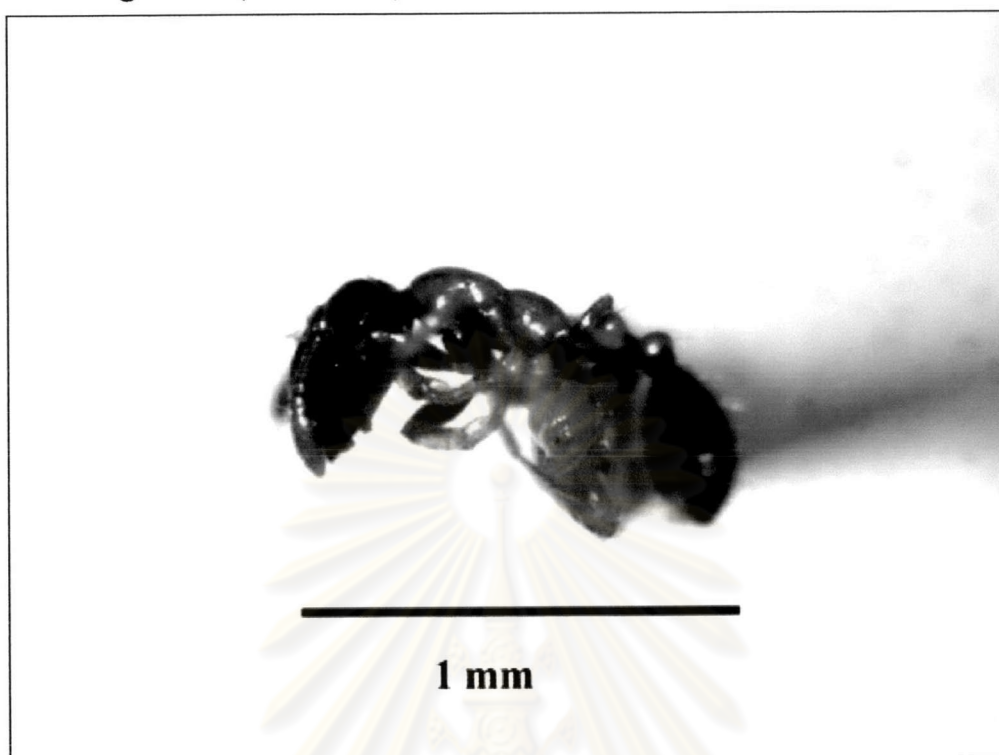
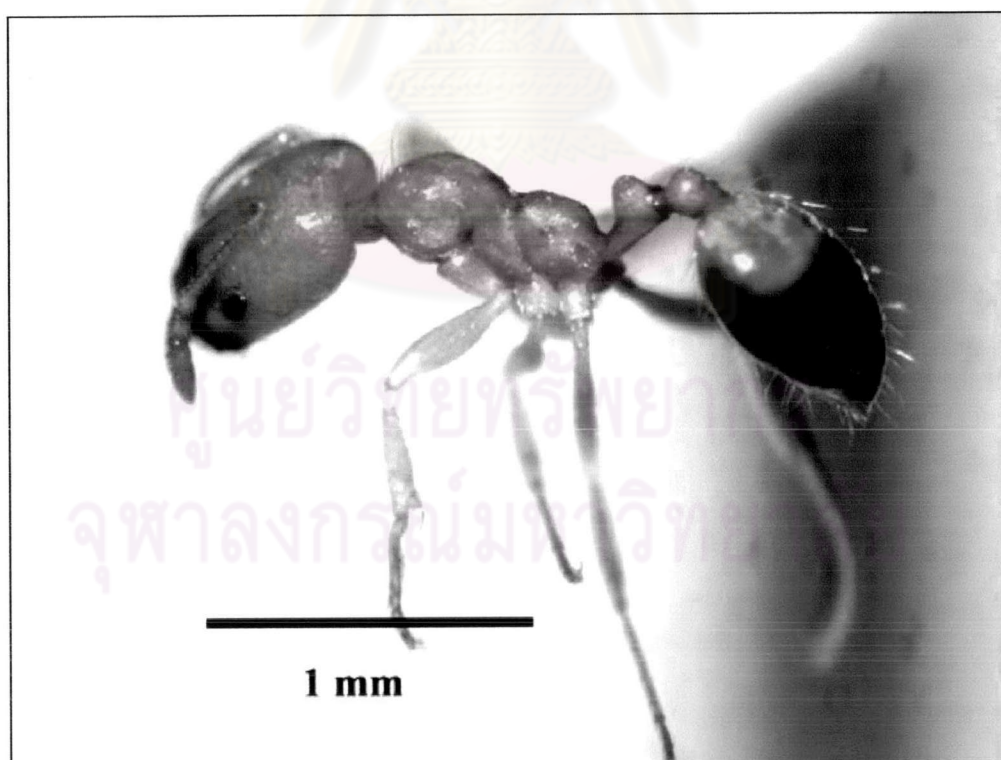


A-8: *Meranopkus bicolor*

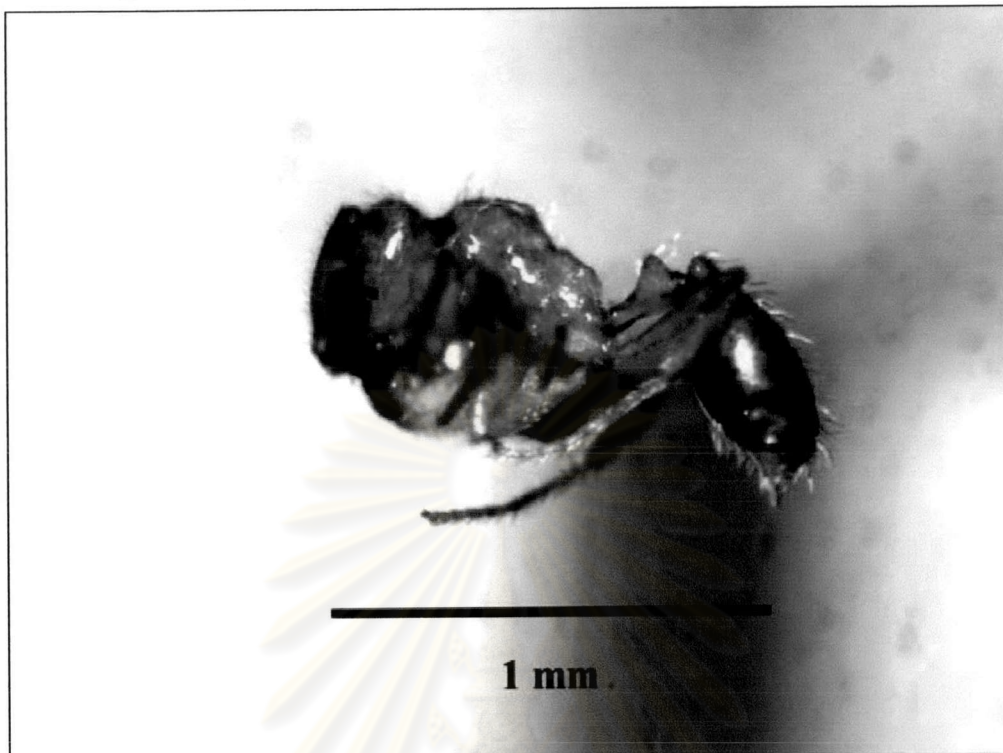
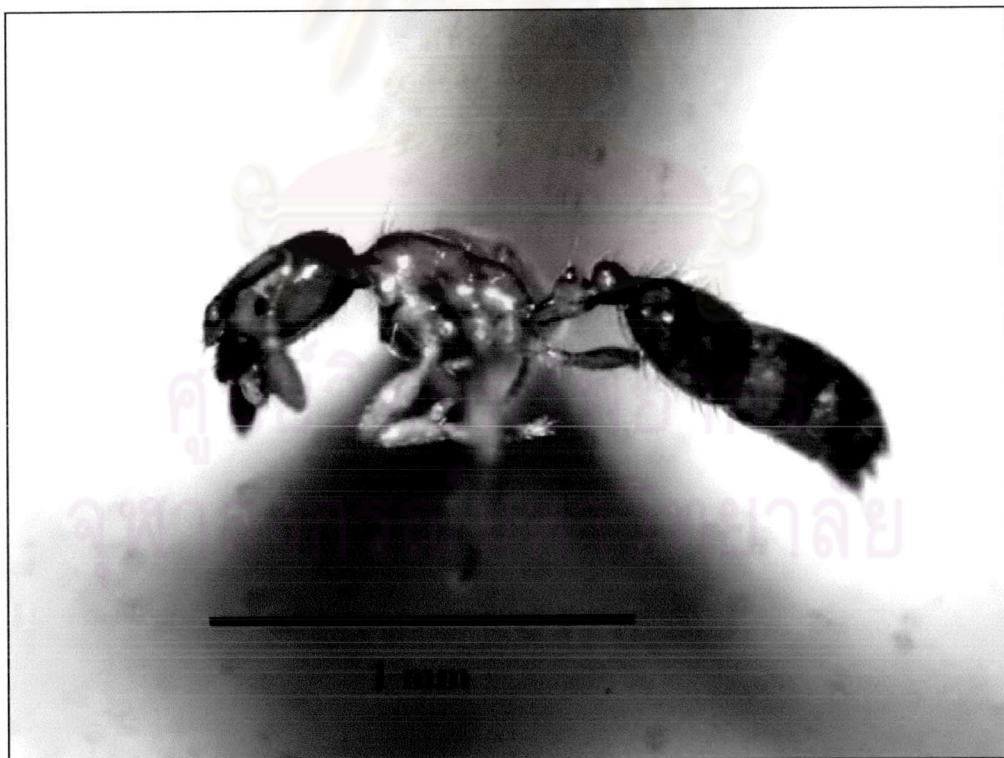
Appendix Figure 1: (continued)

A-9: *Monomorium chinense*A-10: *Monomorium destructor*

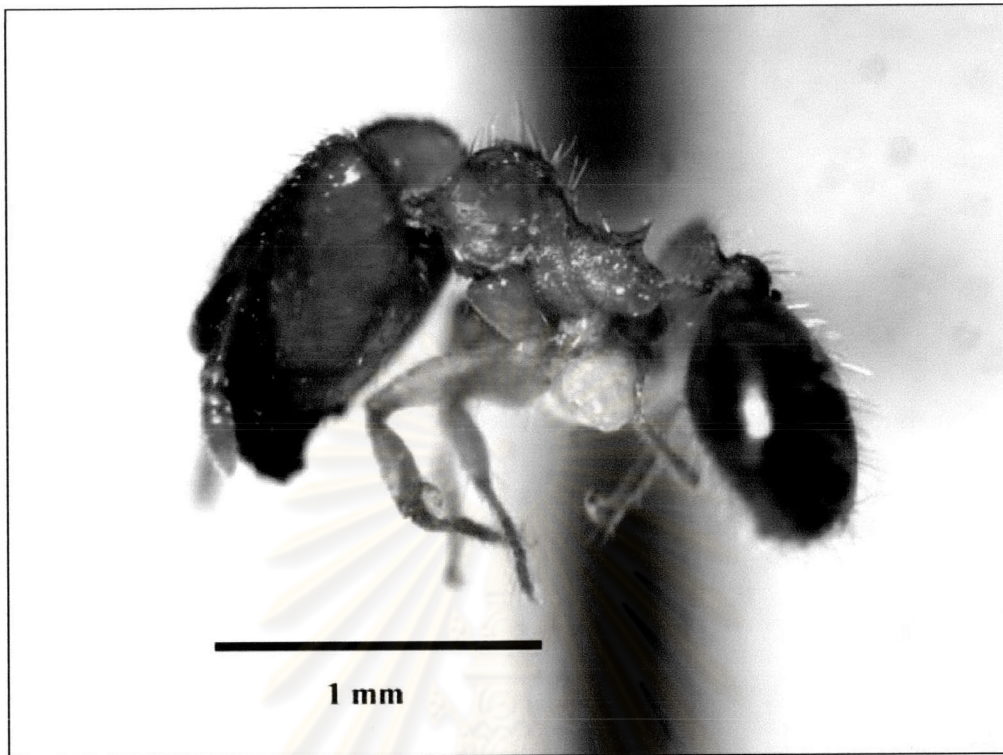
Appendix Figure 1: (continued)

A-11: *Monomorium floricola*A-12: *Monomorium pharaonis*

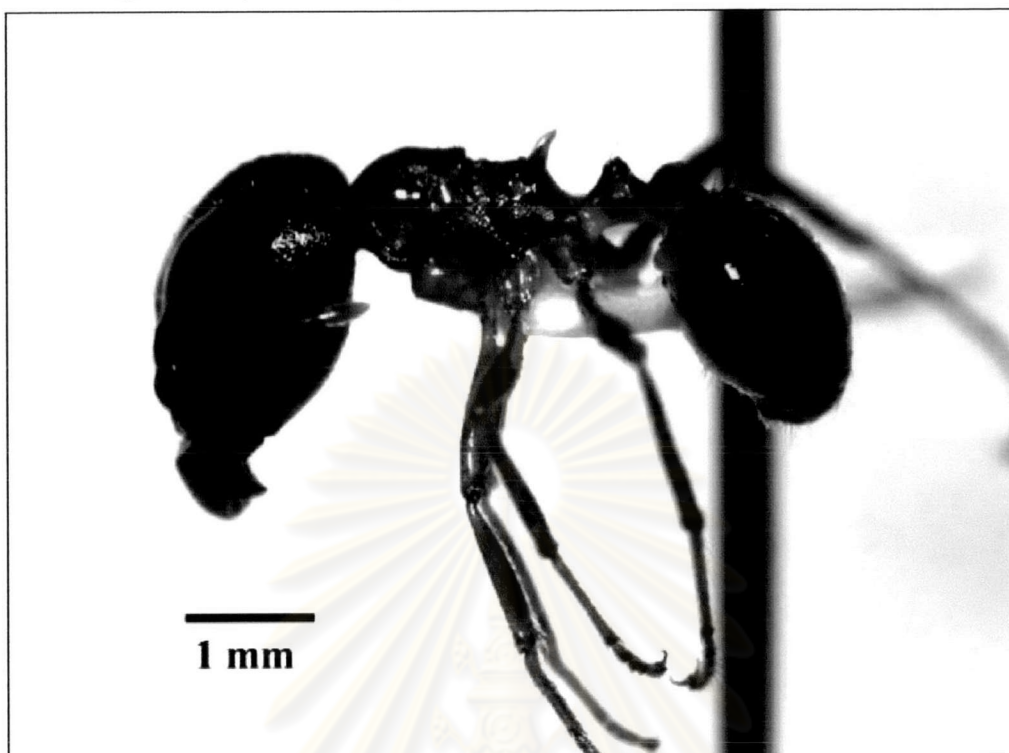
Appendix Figure 1: (continued)

A-13: *Monomorium sechellense*A-14: *Monomorium* sp.

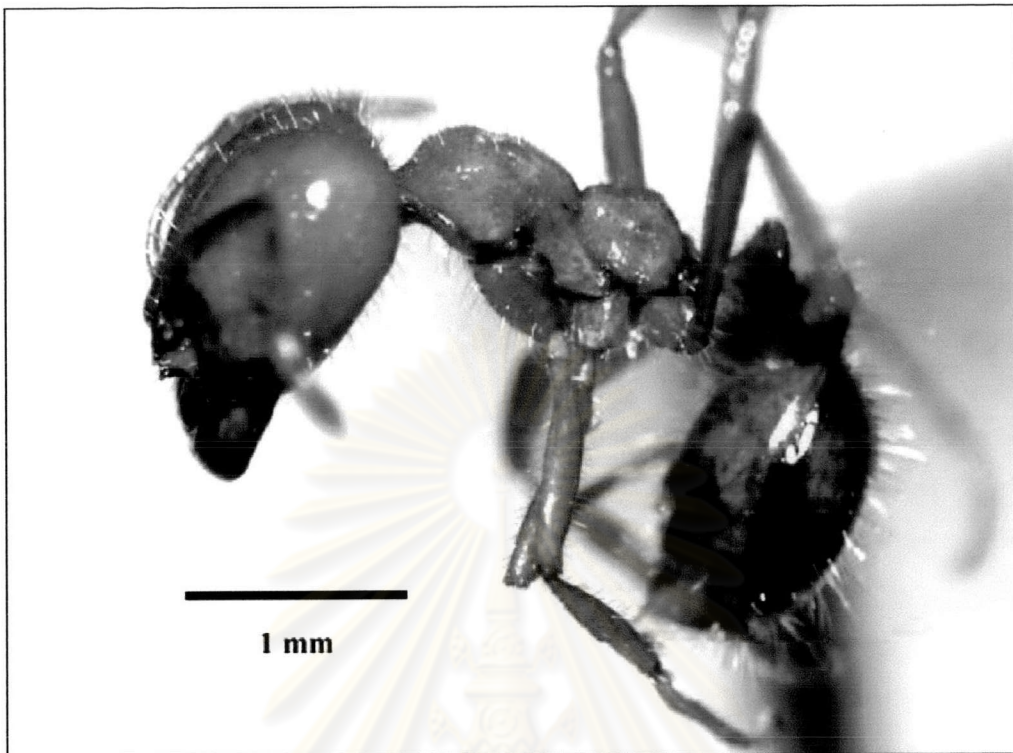
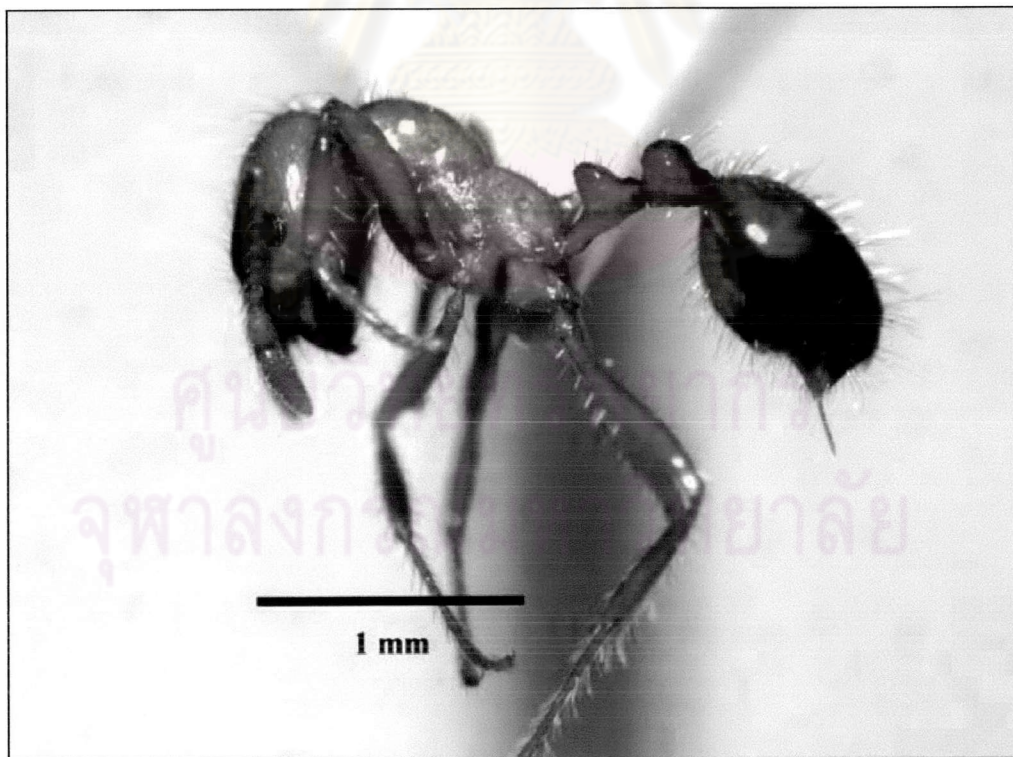
Appendix Figure 1: (continued)

A-15: *Pheidole bugi* (major)A-16: *Pheidole bugi* (minor)

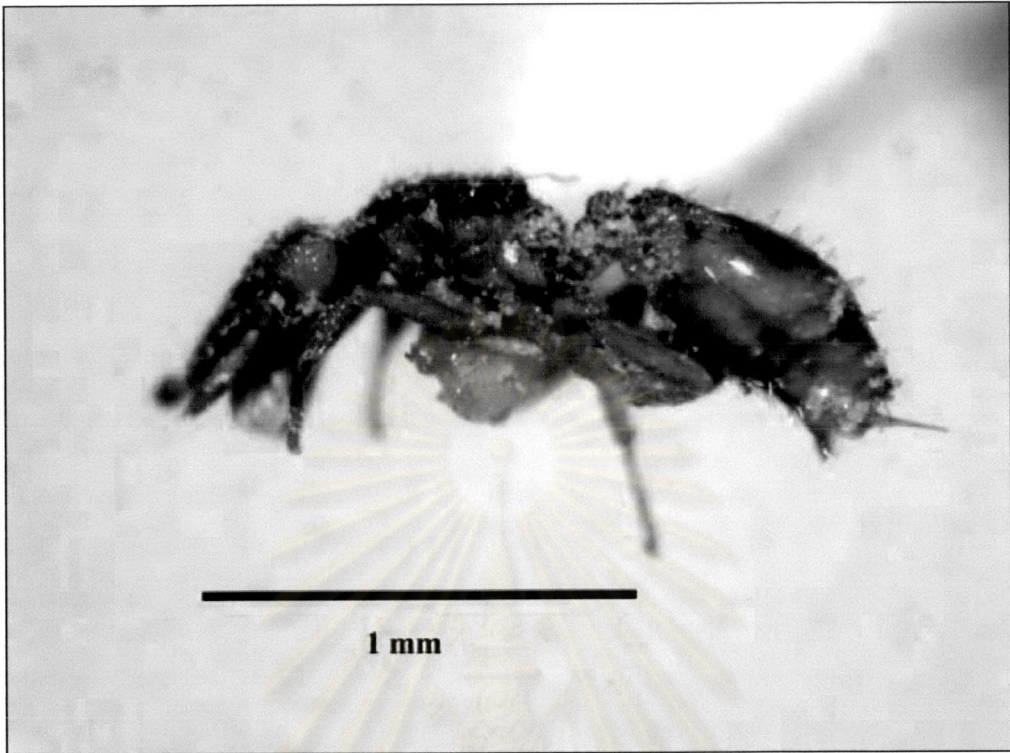
Appendix Figure 1: (continued)

A-17: *Pheidologeton diversus* (major)A-18: *Pheidologeton diversus* (minor)

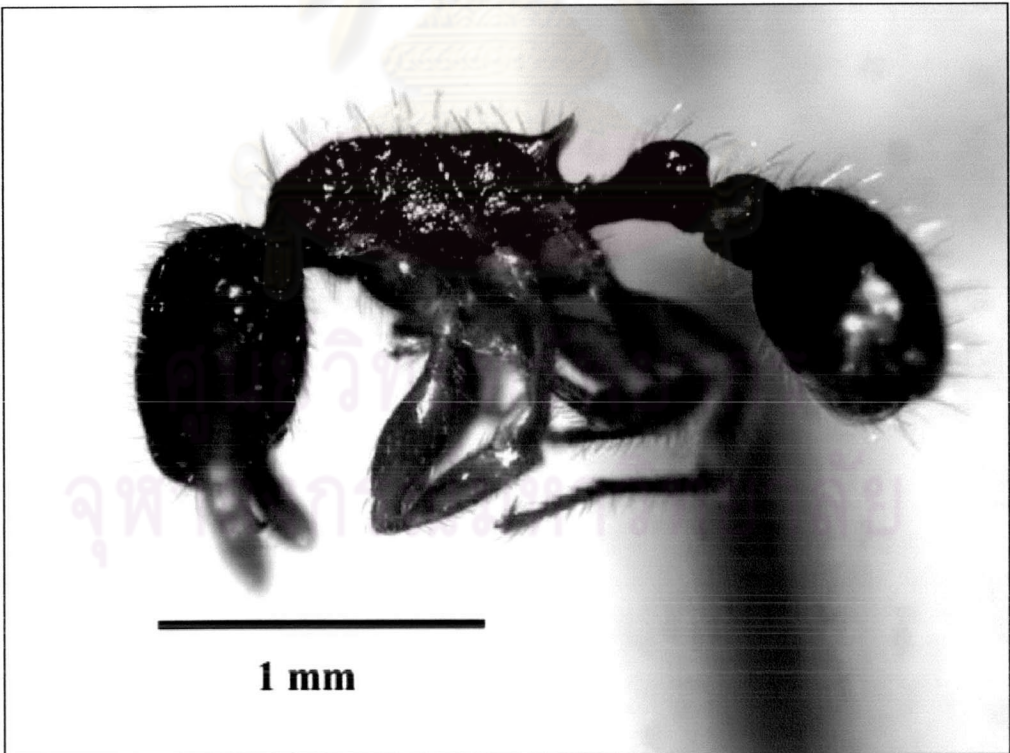
Appendix Figure 1: (continued)

A-19: *Solenopsis geminata* (major)A-20: *Solenopsis geminata* (minor)

Appendix Figure 1: (continued)

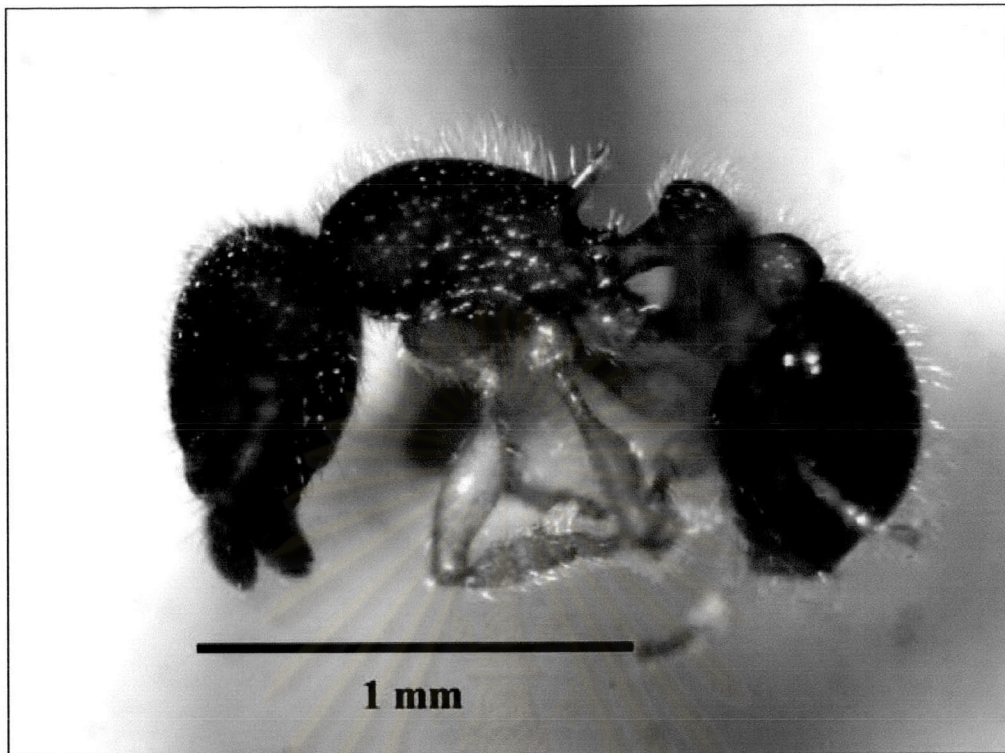
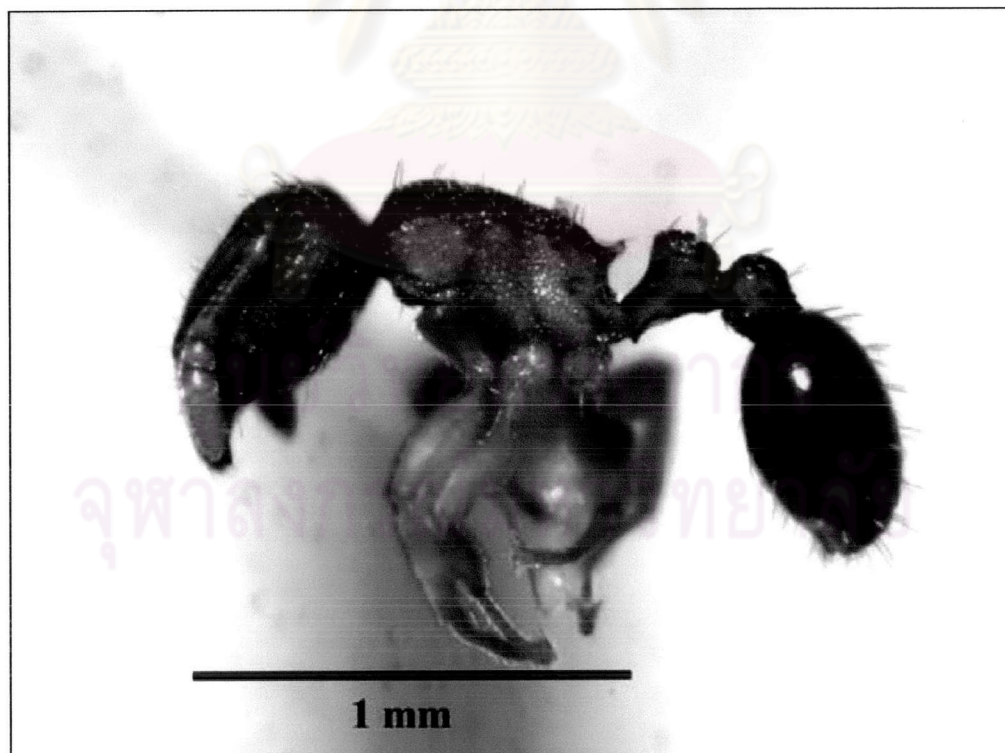


A-21: *Strumigenys* sp.

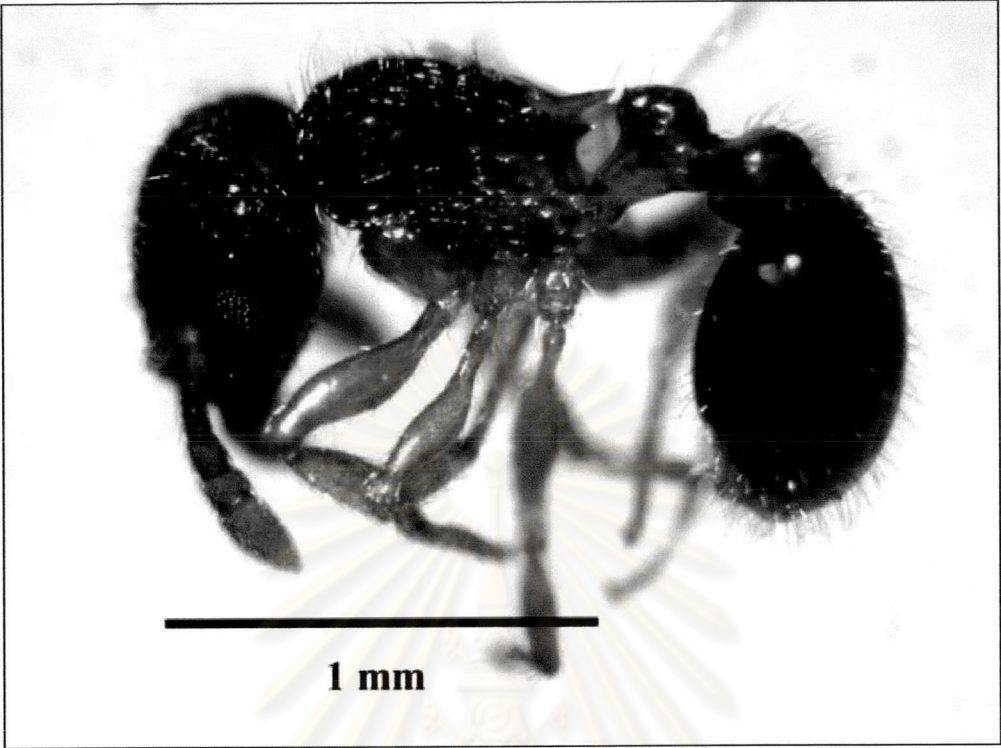


A-22: *Tetramorium bicarinatum*

Appendix Figure 1: (continued)

A-23: *Tetramorium lanuginosum*A-24: *Tetramorium simillimum*

Appendix Figure 1: (continued)

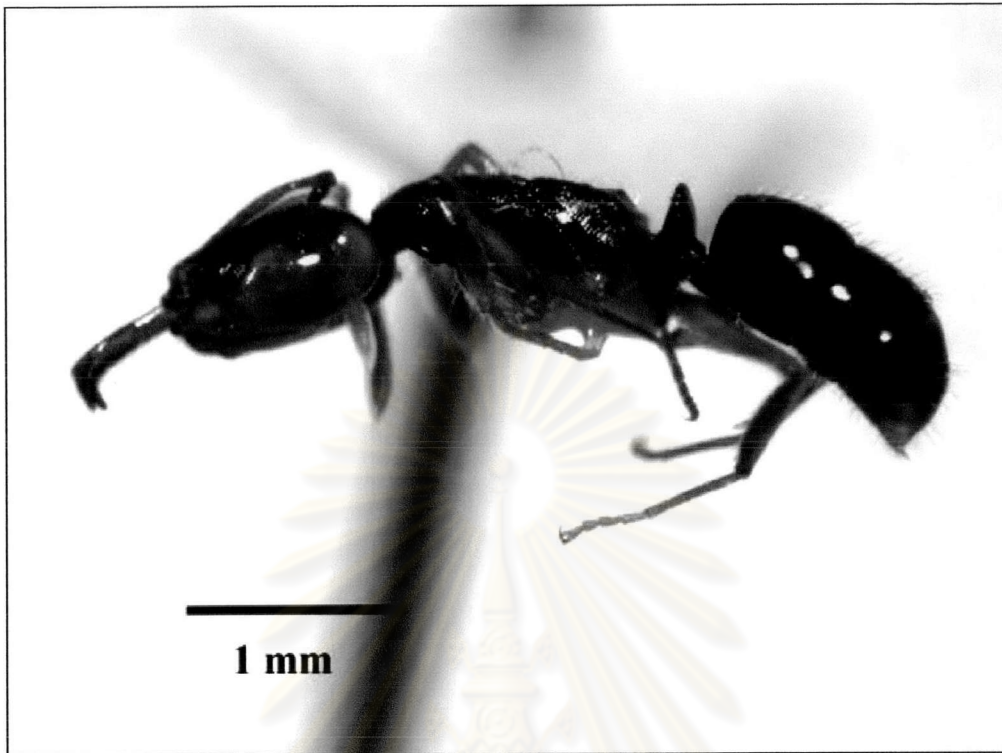
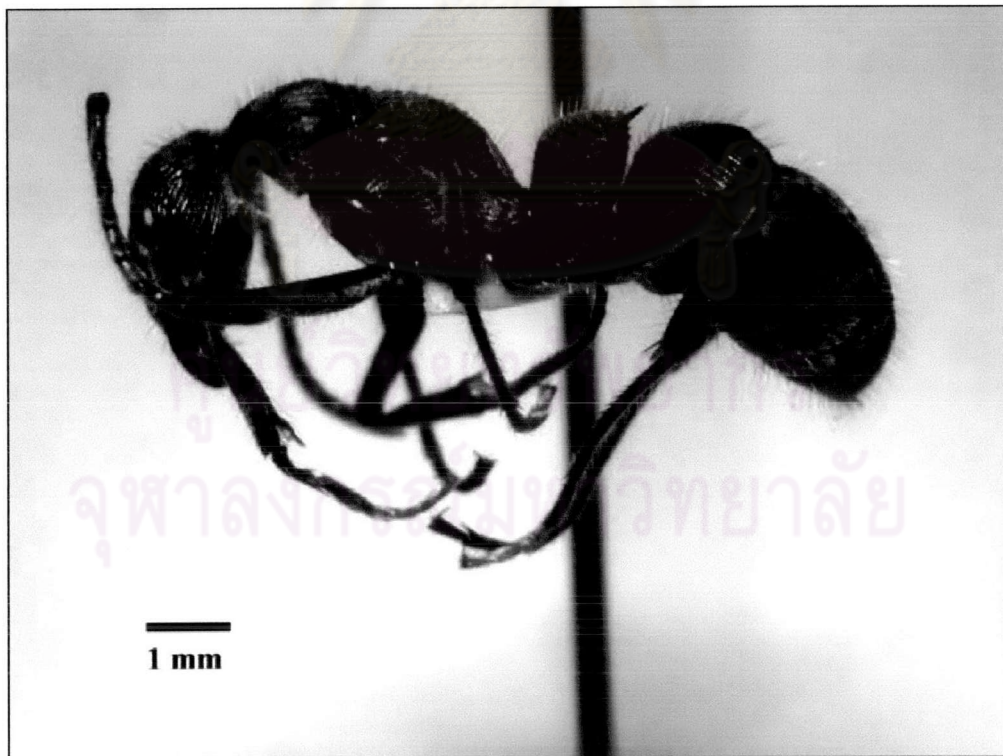


A-25: *Tetramorium smithi*

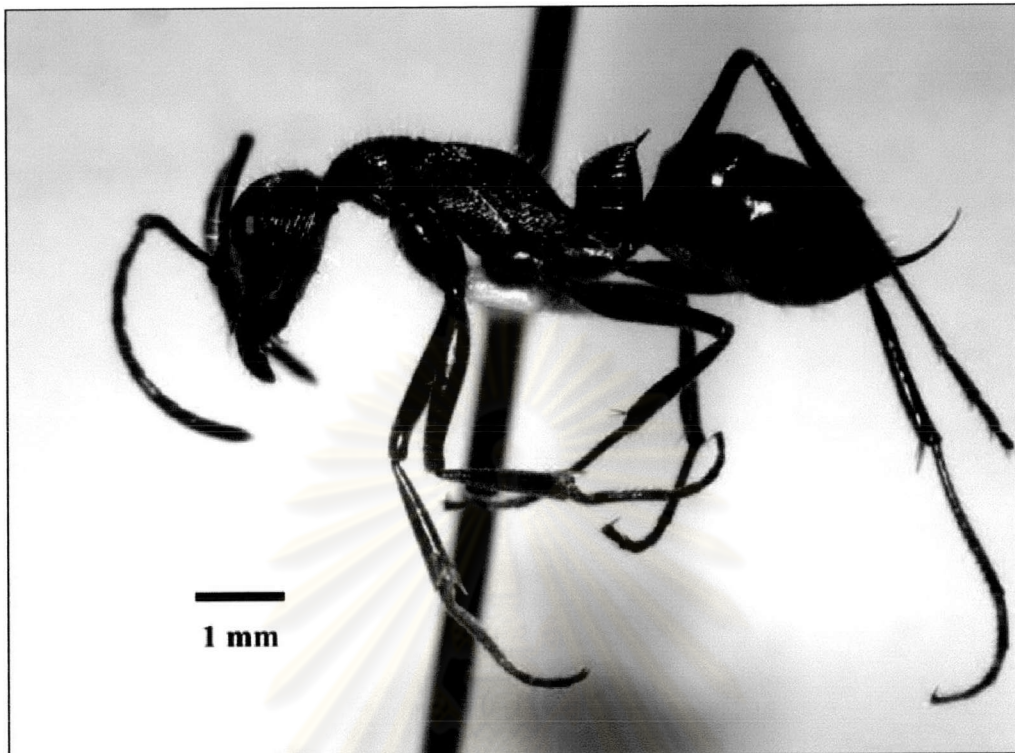
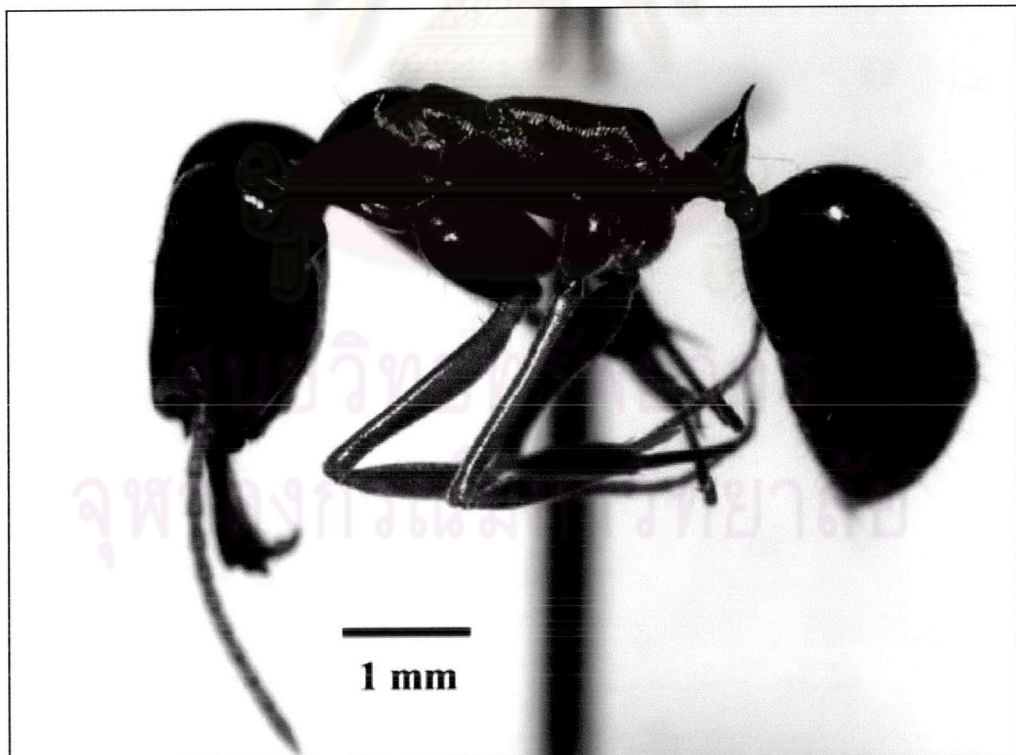


A-26: *Tetramorium* sp.6 of AMK

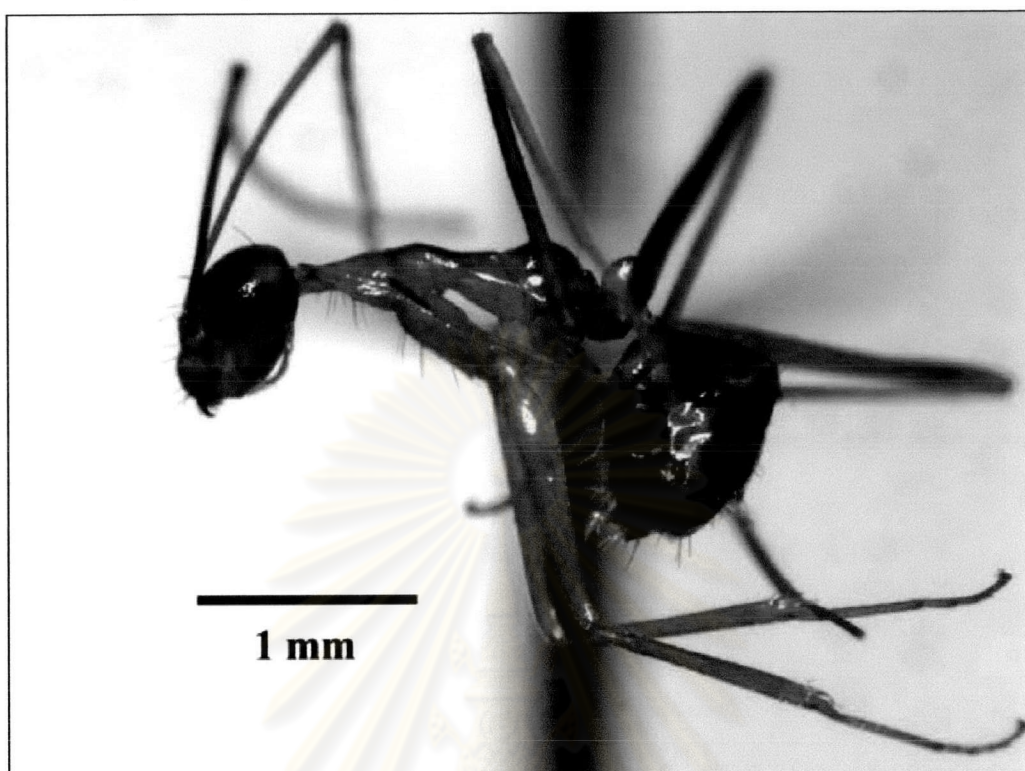
Appendix Figure 1: (continued)

A-27: *Anochetus graeffei*A-28: *Diacamma rugosum*

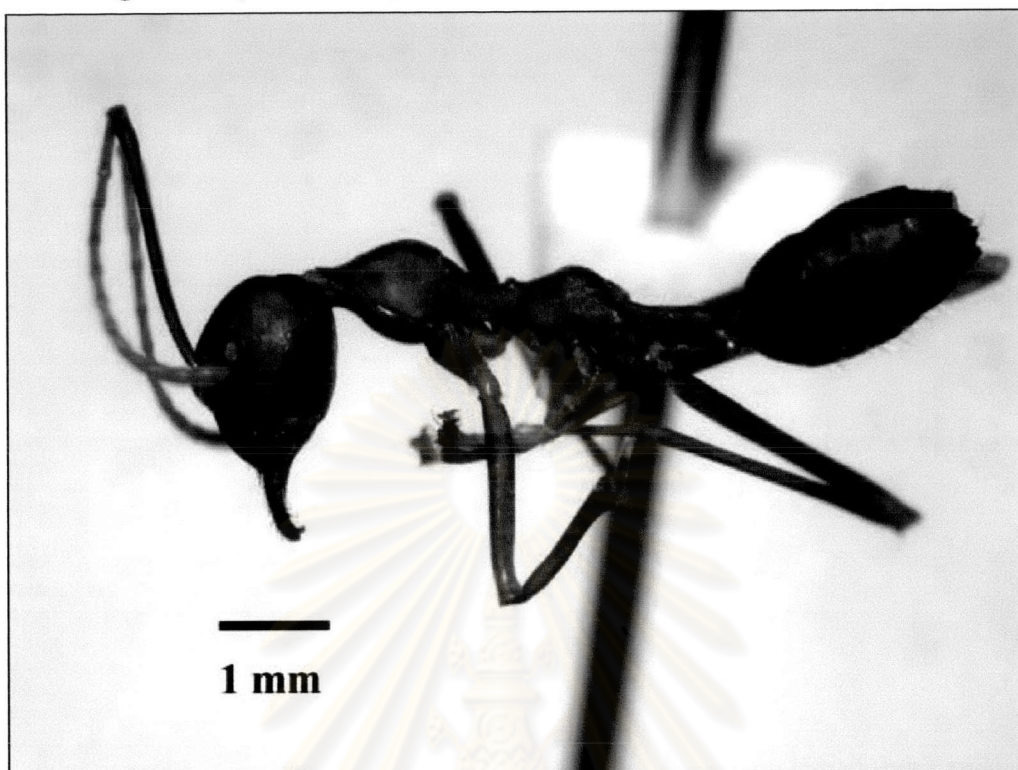
Appendix Figure 1: (continued)

A-29: *Diacamma vagans*A-30: *Odontomachus simillimus*

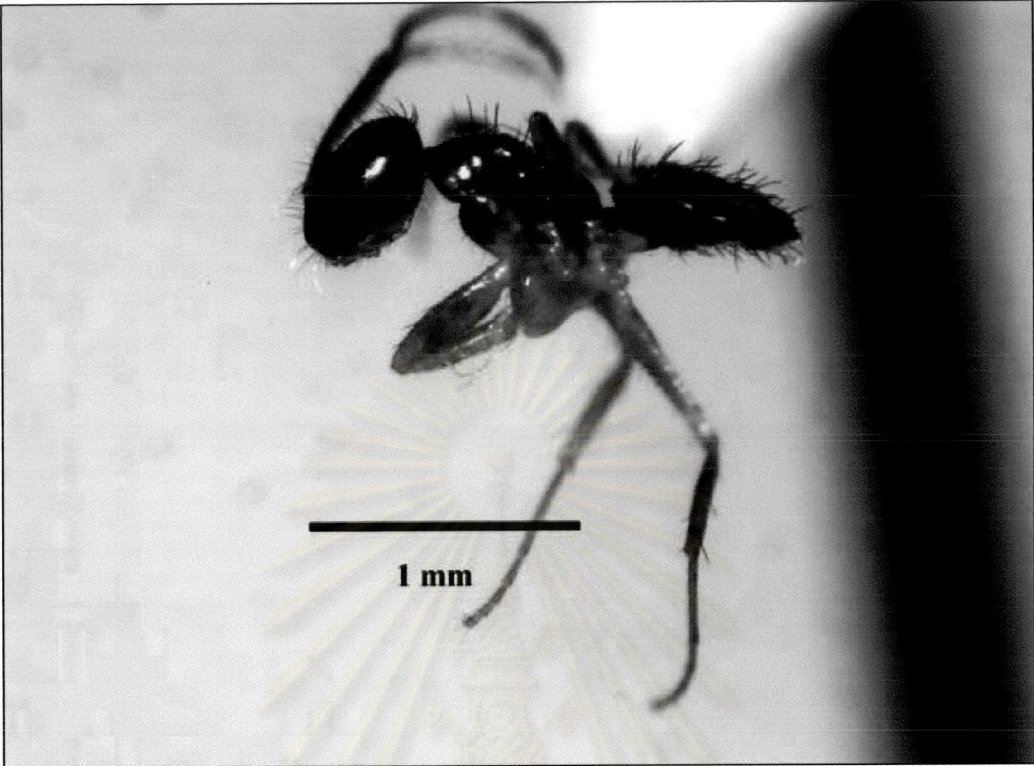
Appendix Figure 1: (continued)

A-31: *Anoplolepis gracillipes*A-32: *Camponotus rufoglaucus*

Appendix Figure 1: (continued)

A-33: *Oecophylla smaragdina*A-34: *Paratrechina longicornis*

Appendix Figure 1: (continued)

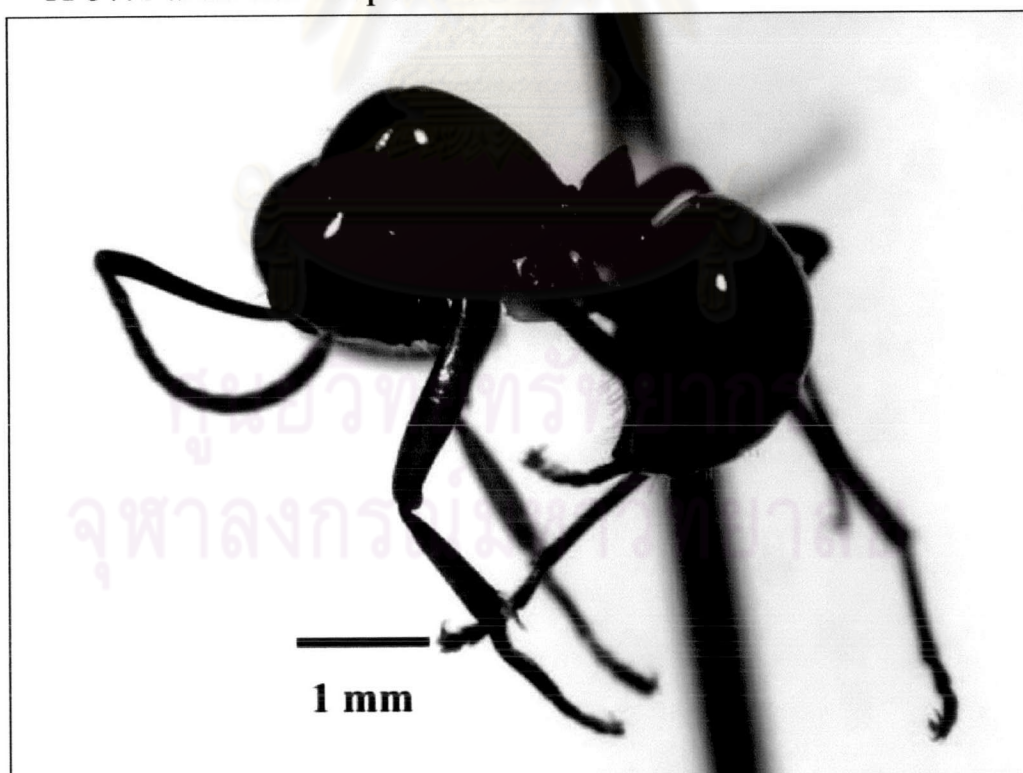


A-35: *Paratrechina* sp.5 of AMK

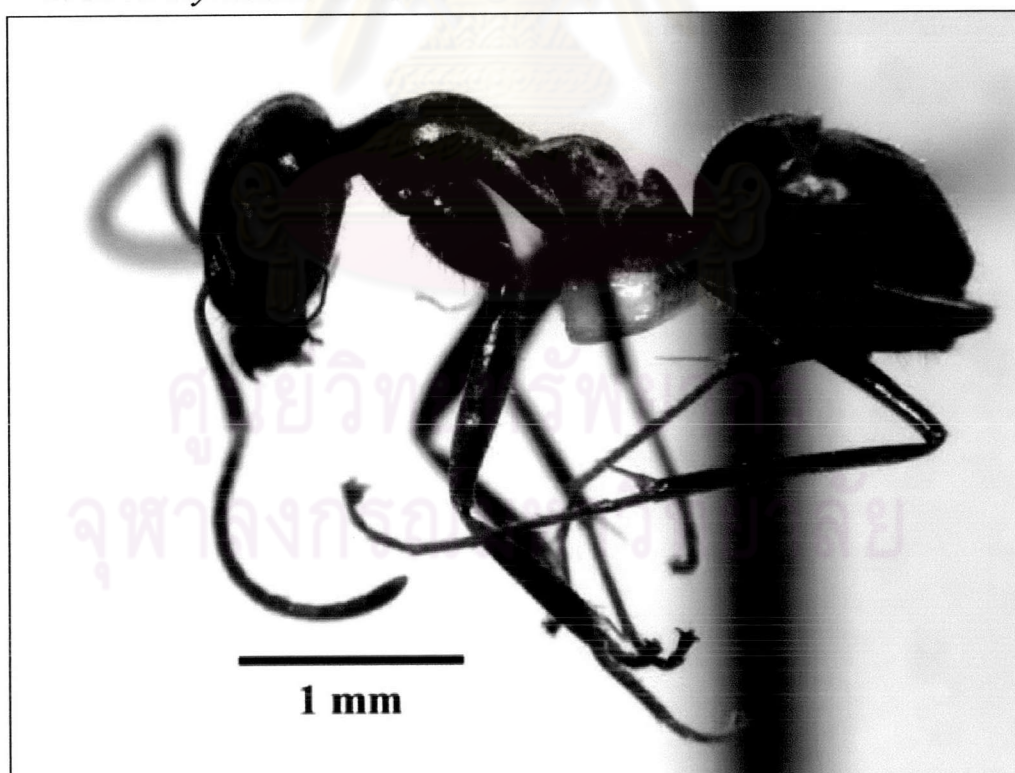


A-36: *Paratrechina* sp.8 of AMK

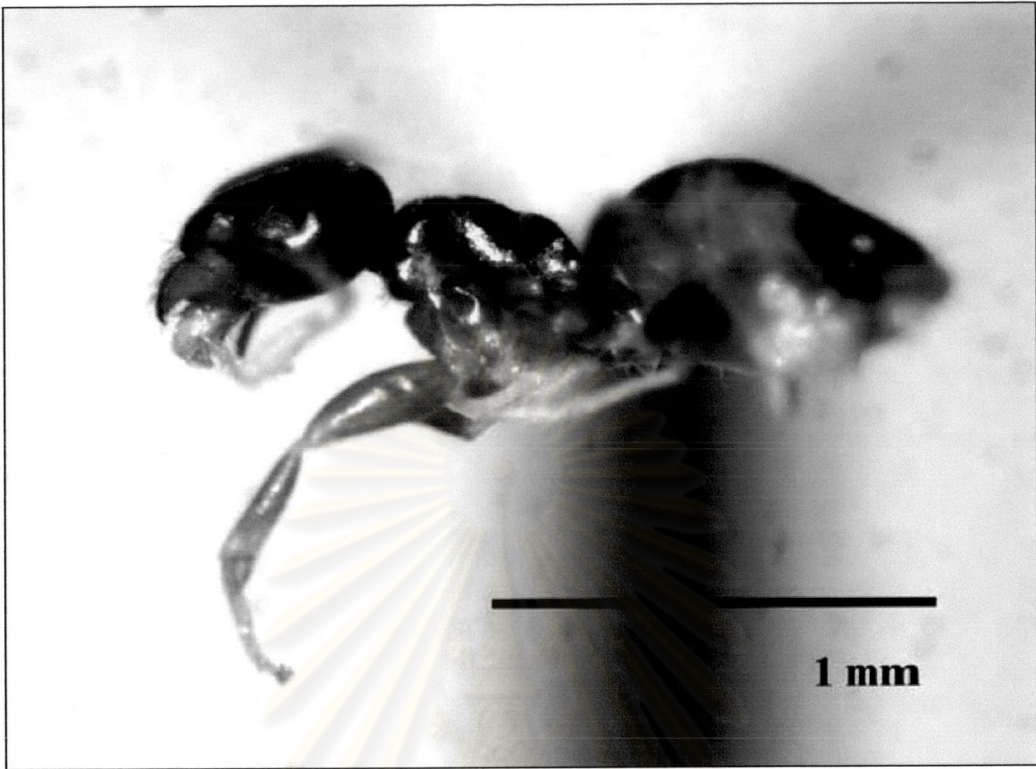
Appendix Figure 1: (continued)

A-37: *Paratrechina* sp.9 of AMKA-38: *Polyrhachis laevissima*

Appendix Figure 1: (continued)

A-39: *Polyrhachis dives*A-40: *Iridomyrmex anceps*

Appendix Figure 1: (continued)

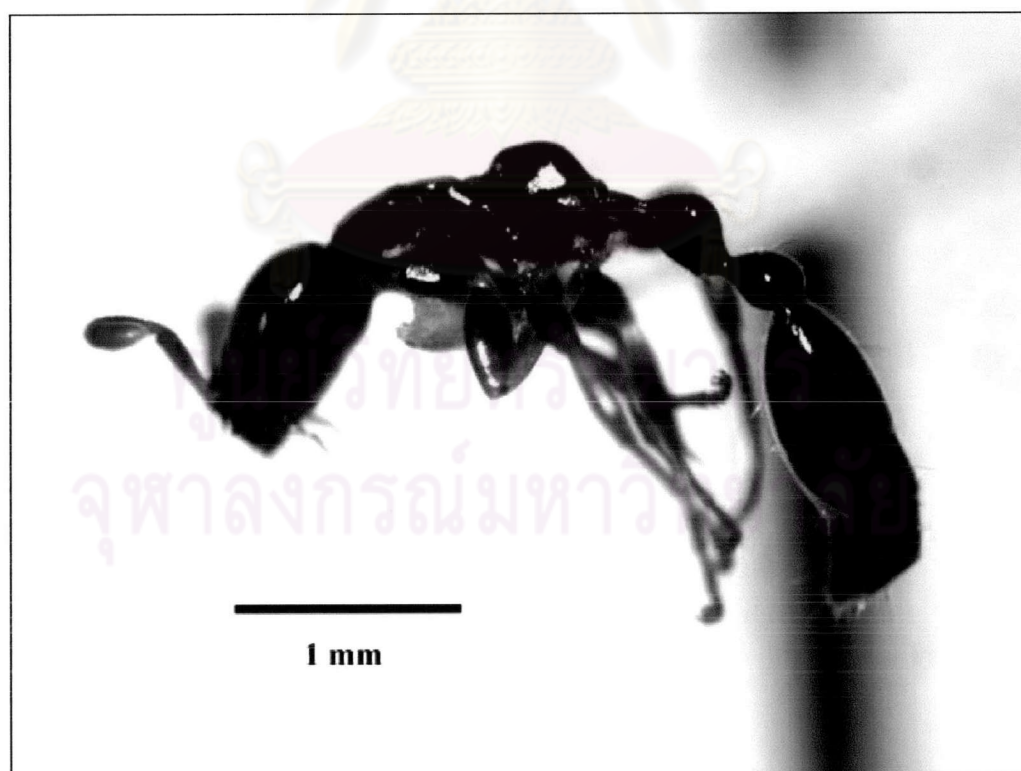


A-41: *Tapinoma melanocephalum*

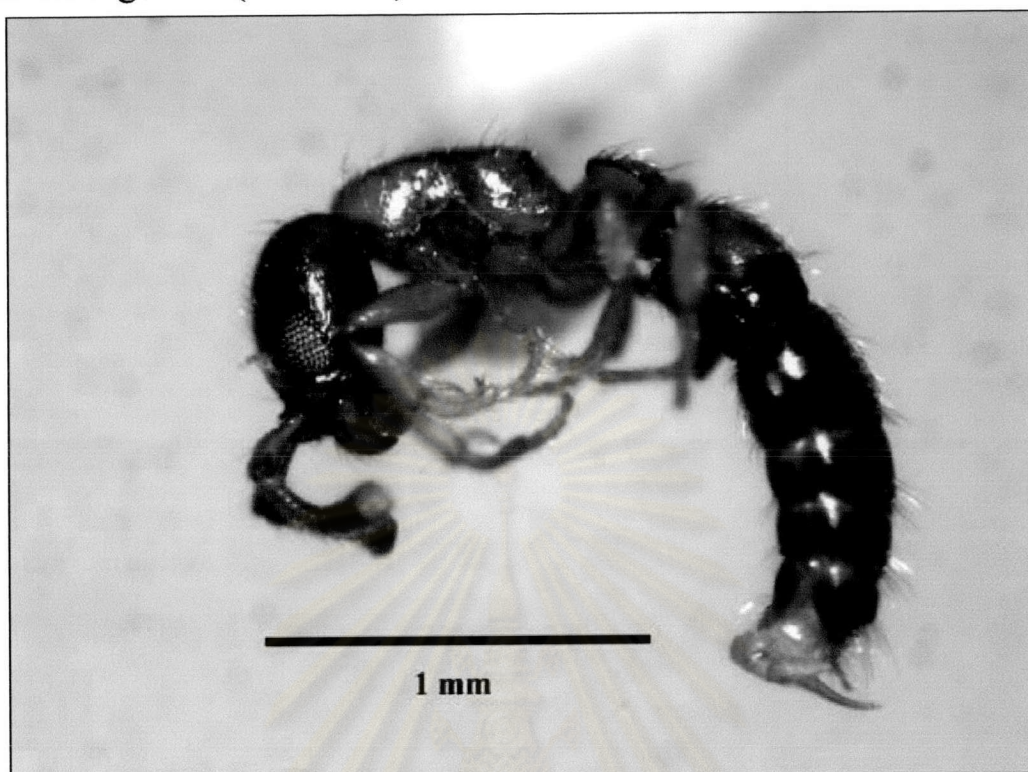


A-42: *Tapinoma* sp.

Appendix Figure 1: (continued)

A-43: *Tetraponera rufonigra*A-44: *Tetraponera allaborans*

Appendix Figure 1: (continued)

A-45: *Cerapachys longitarsus*

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Appendix Figure 2: Study sites in each public park



B-1: Building site in Suang Luang Rama IX



B-2: Grass field in Suang Luang Rama IX

Appendix Figure 2: (continued)



B-3: Standing-tree site in Suang Luang Rama IX



B-4: Building site in Queen Sirikit Park

Appendix Figure 2: (continued)



B-5: Grass field in Queen Sirikit Park



B-6: Standing-tree site in Queen Sirikit Park

Appendix Figure 2: (continued)



B-7: Building site in Lumpini Park



B-8: Grass field in Lumpini Park

Appendix Figure 2: (continued)



B-9: Standing-tree site in Lumpini Park

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Appendix Table 1: Species list of ants in Suan Luang Rama IX during March 2003 to February 2004

Subfamily	Species list	Sampling method			Season	
		PT	HB	TUS	W	D
Myrmicinae	<i>Cardiocondyla emeryi</i>	1	1	1	1	1
	<i>Cardiocondyla nuda</i>	1	1	0	0	1
	<i>Catulacus granulatus</i>	0	0	1	1	1
	<i>Crematogaster</i> sp.9 of AMK	0	0	1	0	1
	<i>Crematogaster (Orthocrema)</i> sp.1 of AMK	0	0	1	1	1
	<i>Meranoplus bicolor</i>	1	1	1	1	1
	<i>Monomorium chinense</i>	0	1	0	0	1
	<i>Monomorium floricola</i>	1	1	1	1	1
	<i>Monomorium pharaonis</i>	0	1	0	0	1
	<i>Monomorium sechellense</i>	1	0	1	1	1
	<i>Monomorium</i> sp.	0	1	1	1	1
	<i>Pheidole bugi</i>	1	1	1	1	1
	<i>Pheidologeton diversus</i>	0	1	1	1	1
	<i>Solenopsis geminata</i>	0	1	1	1	1
	<i>Tetramorium bicarinatum</i>	0	0	1	1	1
	<i>Tetramorium lanuginosum</i>	0	0	1	1	0
	<i>Tetramorium simillimum</i>	0	0	1	1	1
	<i>Tetramorium smithi</i>	1	1	1	1	1
	Ponerinae	<i>Diacamma rugosum</i>	0	0	1	1
<i>Diacamma vagans</i>		0	1	0	1	0
<i>Odontomachus simillimus</i>		0	0	1	1	0
Formicinae	<i>Anoplolepis gracillipes</i>	0	1	1	1	1
	<i>Camponotus rufoglaucus</i>	0	1	0	0	1
	<i>Oecophylla smaragdina</i>	0	1	1	1	1
	<i>Paratrechina longicornis</i>	1	1	1	1	1
	<i>Paratrechina</i> sp. 5 of AMK	1	1	1	1	1
	<i>Paratrechina</i> sp.8 of AMK	0	1	1	1	1
	<i>Polyrhachis (Myrmhopla) dives</i>	0	0	1	1	0
Dolichoderinae	<i>Iridomyrmex anceps</i>	0	0	1	1	0
	<i>Tapinoma melanocephalum</i>	0	1	1	1	1
	<i>Tapinoma</i> sp.	0	0	1	1	1
Pseudomyrmecinae	<i>Tetraoponera rufonigra</i>	0	0	1	1	1
	<i>Tetraoponera allaborans</i>	0	0	1	0	1
Total	33 species	9	19	28	27	28

Note: PT = Pitfall Trapping, HB = Honey Baiting, TUS = Time Unit Method
W = Wet season, D = Dry season

Appendix Table 2: Species list of ants in Queen Sirikit Park during March 2003 to February 2004

Subfamily	Species list	Sampling method			Season		
		PT	HB	TUS	W	D	
Myrmicinae	<i>Cardiocondyla emeryi</i>	1	1	1	1	1	
	<i>Crematogaster rogenhoferi</i>	1	0	1	1	1	
	<i>Crematogaster</i> sp.9 of AMK	1	0	1	0	1	
	<i>Meranoplus bicolor</i>	1	1	1	1	1	
	<i>Monomorium chinense</i>	1	1	1	1	1	
	<i>Monomorium destructor</i>	0	1	0	1	1	
	<i>Monomorium floricola</i>	1	0	1	1	1	
	<i>Monomorium pharaonis</i>	0	1	0	1	1	
	<i>Monomorium sechellense</i>	1	0	0	1	0	
	<i>Monomorium</i> sp.	1	1	0	1	1	
	<i>Pheidole bugi</i>	1	1	1	1	1	
	<i>Pheidologeton diversus</i>	0	0	1	0	1	
	<i>Smithistruma</i> sp.	1	0	0	0	1	
	<i>Solenopsis geminata</i>	0	1	1	1	1	
	<i>Strumigenys</i> sp.	1	0	0	1	1	
	<i>Tetramorium lanuginosum</i>	0	0	1	0	1	
	<i>Tetramorium simillimum</i>	1	0	0	0	1	
	<i>Tetramorium smithi</i>	1	1	1	1	1	
	Ponerinae	<i>Anochetus graeffei</i>	1	0	1	1	1
		<i>Diacamma rugosum</i>	0	1	0	1	0
<i>Odontomachus simillimus</i>		0	0	1	1	1	
Formicinae	<i>Camponotus rufoglaucus</i>	1	1	1	1	1	
	<i>Oecophylla smaragdina</i>	0	1	1	1	1	
	<i>Paratrechina longicornis</i>	1	1	1	1	1	
	<i>Paratrechina</i> sp. 5 of AMK	1	1	1	1	1	
	<i>Paratrechina</i> sp.8 of AMK	0	1	1	1	1	
	<i>Paratrechina</i> sp.9 of AMK	1	0	1	1	1	
Dolichoderinae	<i>Tapinoma melanocephalum</i>	1	1	1	1	1	
	<i>Tapinoma</i> sp.	1	0	1	0	1	
Pseudomyrmecinae	<i>Tetraponera rufonigra</i>	1	0	0	1	1	
Cerapachyinae	<i>Cerapachys longitarsus</i>	1	0	0	1	1	
Total	31 species	22	16	21	25	29	

Note: PT = Pitfall Trapping, HB = Honey Baiting, TUS = Time Unit Method
W = Wet season, D = Dry season

Appendix Table 3: Species list of ants in Lumpini Park during March 2003 to February 2004

Subfamily	Species list	Sampling method			Season		
		PT	HB	TUS	W	D	
Myrmicinae	<i>Cardiocondyla emeryi</i>	1	1	0	1	1	
	<i>Cardiocondyla nuda</i>	1	0	0	0	1	
	<i>Crematogaster</i> sp.3 of AMK	0	0	1	0	1	
	<i>Crematogaster</i> sp.9 of AMK	0	0	1	0	1	
	<i>Meranoplus bicolor</i>	0	1	0	1	1	
	<i>Monomorium chinense</i>	1	1	1	1	1	
	<i>Monomorium destructor</i>	1	1	1	1	1	
	<i>Monomorium floricola</i>	1	1	1	1	1	
	<i>Monomorium pharaonis</i>	1	1	1	1	1	
	<i>Monomorium sechellense</i>	1	1	1	1	1	
	<i>Monomorium</i> sp.	0	0	1	0	1	
	<i>Pheidole bugi</i>	1	1	1	1	1	
	<i>Pheidologeton diversus</i>	1	0	1	1	1	
	<i>Solenopsis geminata</i>	1	1	1	1	1	
	<i>Tetramorium lanuginosum</i>	0	1	1	0	1	
	<i>Tetramorium simillimum</i>	0	1	0	1	0	
	<i>Tetramorium smithi</i>	1	0	1	1	1	
	<i>Tetramorium</i> sp.6 of AMK	0	0	1	1	0	
	Ponerinae	<i>Anochetus graeffei</i>	1	0	1	1	1
		<i>Diacamma vagans</i>	1	1	1	1	1
<i>Odontomachus simillimus</i>		0	0	1	1	1	
Formicinae	<i>Anoplolepis gracillipes</i>	0	1	0	0	1	
	<i>Oecophylla smaragdina</i>	0	0	1	1	1	
	<i>Paratrechina longicornis</i>	0	1	1	1	1	
	<i>Paratrechina</i> sp. 5 of AMK	1	1	1	1	1	
	<i>Paratrechina</i> sp.8 of AMK	0	0	1	1	1	
	<i>Paratrechina</i> sp.9 of AMK	0	0	1	0	1	
	<i>Polyrhachis laevissima</i>	0	0	1	1	1	
Dolichoderinae	<i>Iridomyrmex anceps</i>	1	1	1	1	1	
	<i>Tapinoma melanocephalum</i>	0	1	1	1	1	
Pseudomyrmecinae	<i>Tetraoponera ruflonigra</i>	0	1	1	0	1	
Total	31 species	15	18	26	23	29	

Note: PT = Pitfall Trapping, HB = Honey Baiting, TUS = Time Unit Method
W = Wet season, D = Dry season

Appendix Table 4: Spearman coefficient of environmental factors and species richness of ants.

Site		Temperature	Relative Humidity	Rainfall
SUA	Species richness			
	- Time Unit Method	-0.618	0.441	0.500
	- Pitfall trapping	0.754	-0.406	-0.174
	- Honey baiting	0.493	0.116	0.580
SIR	Species richness			
	- Time Unit Method	-0.368	-0.493	-0.841*
	- Pitfall trapping	-0.412	0.508	0.294
	- Honey baiting	-0.371	-0.174	0.314
LUM	Species richness			
	- Time Unit Method	0.537	-0.618	-0.177
	- Pitfall trapping	0.264	0.105	0.316
	- Honey baiting	-0.678	0.577	-0.516

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Appendix Table 5: Spearman coefficient of environmental factors and abundance of ants.

Site	Abundance	Temperature	Relative Humidity	Rainfall
SUA	Pitfall trapping <i>Paratrechina</i> sp.5 of AMK	0.429	0.371	0.143
	Honey baiting <i>Pheidole bugi</i>	0.429	-0.086	0.029
SIR	Pitfall trapping <i>Monomorium</i> sp.	0.257	0.029	0.429
	<i>Paratrechina</i> sp.5 of AMK	0.086	0.143	0.029
	<i>Pheidole bugi</i>	-0.086	0.200	0.771
	<i>Tapinoma melanocephalum</i>	0.543	-0.314	-0.086
	<i>Tetraponera rufonigra</i>	0.000	-0.278	-0.123
	Honey baiting <i>Monomorium chinense</i>	0.371	-0.543	-0.086
	<i>Paratrechina</i> sp.5 of AMK	0.257	-0.314	-0.086
	<i>Pheidole bugi</i>	0.314	-0.486	-0.714
	<i>Solenopsis geminata</i>	0.371	-0.543	-0.086
LUM	Pitfall trapping <i>Diacamma vagans</i>	0.51	0.667	0.154
	<i>Iridomyrmex anceps</i>	0.800	-0.800	-0.700
	<i>Paratrechina</i> sp.5 of AMK	-0.100	0.500	0.100
	<i>Pheidole bugi</i>	-0.300	-0.300	0.000
	<i>Pheidologeton diversus</i>	-0.200	-0.500	0.200
	Honey baiting <i>Cardiocondyla emeryi</i>	-0.088	0.232	-0.116
	<i>Monomorium chinense</i>	0.551	0.143	-0.486
	<i>Paratrechina longicornis</i>	-0.029	0.200	0.429
	<i>Paratrechina</i> sp.5 of AMK	-0.058	0.657	-0.200
	<i>Pheidole bugi</i>	0.638	-0.543	-0.257
	<i>Solenopsis geminata</i>	-0.087	0.771	0.371

BIOGRAPHY

Mr.Prapakorn Tantayotai was born on July 8, 1979, in Bangkok. He studied about Entomology and finished his Bachelor degree at Department of Biology, Faculty of Science, Chulalongkorn University in 2000. And continued to study Master degree at the same Department in 2001.



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