



## Introduced ants in the United Arab Emirates

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Fifteen species of introduced ants, including eight cosmopolitan or tramp species, are recorded for the first time in the United Arab Emirates. They are *Cardiocondyla emeryi*, *Camponotus compressus*, *Iridomyrmex anceps*, *Linepithema humile*, *Monomorium destructor*, *Monomorium indicum*, *Pachycondyla sennaarensis*, *Paratrechina flavipes*, *Paratrechina jaegerskioeldi*, *Paratrechina longicornis*, *Pheidole teneriffana*, *Solenopsis geminata*, *Tapinoma melanocephalum*, *Tapinoma simrothi* and *Tetramorium bicarinatum*. A synopsis of their distribution, biology and pest status is given. Introduced species contribute an unusually high proportion of local ants and the ecological implications of their presence are discussed, including displacement of native fauna and impact upon human health. These ants abound in man-made, mesic environments and do not reach the characteristic sandy deserts of the region. Most invasive species are probably benign, but *P.sennaarensis*, *M.destructor* and *S.geminata* pose potential problems as public health and nuisance pests. The highly competitive *S. geminata* and *L. humile* may also threaten the local entomofauna and biodiversity.

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### Introduction

Since its formation in 1971 the United Arab Emirates (UAE) has developed rapidly. Vast areas of desert are now cultivated and there are 100,000 ha of arable land, producing 259,080 t of vegetables in 1992, and 12 million date palms and 48 million other trees (Anon, 1992). Over-use of water has resulted in a lowering of the water table and an increase in ground-water salinity (Anon, 1993). Use of desalinated water for irrigation is increasing and sewage is also used to irrigate parks and road-side plantations. Development continues and large areas of desert are being converted to

towns, farms, parks and forestry plantations, where water is no longer a confining factor to life.

UAE has long been a centre for trade in the Middle East and many arthropods have probably entered the country on imported goods. Live plants arrive by road from Lebanon, Iraq and Jordan and by sea from Iran, Pakistan and India (Khan, 1983). The increase in urban development and irrigated areas has also encouraged associated arthropods, probably at the expense of the local desert fauna. Knowledge of the ecology of the UAE is scant (Satchell, 1978) and the fauna, particularly invertebrates, is poorly documented (Tigar, 1996). In 1993 only 14 species of ants were known (Tigar & Collingwood, 1993), although over 70 species of ants have now been recorded (D. Agosti, B. Tigar & C. Collingwood, unpublished data). Most of the endemic Arabian ants are described and illustrated in Collingwood & Agosti (1996). However in UAE, introduced and tramp species contribute an unusually high percentage of local ants. Tramp ants are of particular concern because they are very invasive. Here we describe and characterize these introduced species and discuss their impact on man and the local ecosystem.

### Material and methods

A survey of the ant fauna was undertaken in February and March 1995. Samples were collected from all major habitats in the UAE, including open desert, desert margins, mangrove, urban areas and irrigated parks, gardens, oases and arable land. The localities visited and collection details are listed in Table 1. Voucher specimens are kept at the American Museum of Natural History (New York, U.S.A.), the National Avian Research Center (NARC) (Sweihan, UAE) and in the private collection of C.A. Collingwood (U.K.).

### Results

Fifteen introduced ant species, representing four families, were found and are listed in taxonomic order below. Descriptions of their worldwide and local distributions, biology, ecology and pest status are given. They include five species, *Solenopsis geminata* (Fabricius, 1804), *Tetramorium bicarinatum* (Nylander, 1846), *Iridomyrmex anceps* (Roger, 1863), *Linepithema humile* (Mayr, 1868) and *Camponotus compressus* (Fabricius, 1787), not previously recorded in Arabia.

#### *Ponerinae*

*Pachycondyla sennaarensis* (Mayr, 1862) (Local name: 'Samsun' ant)

*Distribution.* This is an African savanna species known from Arabia for the last 100 years. It is now spreading rapidly into most human settlements (Collingwood, 1985), and is found along all major road-side developments, oases, plantations and urban areas of UAE.

*Biology and ecology.* An aggressive ant with a painful sting, and a body length of 4–6 mm. It is a scavenger feeding on food refuse and arthropods. New colonies form rapidly and alate queens are probably attracted to artificial lights. Humid soil conditions are needed for nest building and the irrigation of road-side plantations, gardens and parks seems especially conducive to the spread of this species. Nests are very common in urban areas where they pose a potential health hazard. In Al Ain in

1992 there were at least 30 cases of human allergic reaction and two deaths due to anaphylactic shock following stings from *P. sennaarensis* (Dib *et al.*, 1992). This species also raids bee hives and destroys honey bees (Whitcombe, 1982).

### *Myrmicinae*

#### *Cardiocondyla* spp.

*Distribution.* *Cardiocondyla emeryi* Forel, 1881, *C. nuda* (Mayr, 1866) and *C. wroughtonii* (Forel, 1881) are well known tramp species which have been recorded in other parts of the Arabian Peninsula (Collingwood & van Harten, 1994; Collingwood & Agosti, 1996). In UAE *C. emeryi* was only collected from Ruwais.

*Biology and ecology.* Little is known about the biology of *Cardiocondyla* spp. They are tiny, unobtrusive ants with a body length ranging from 1.5–2.5 mm. These ants have little direct impact on the environment; however, they may compete with three similar Arabian endemics: *C. shuckardi* Forel, 1881, *C. gallagheri* Collingwood & Agosti, 1996 and *C. yemene* Collingwood & Agosti, 1996.

**Table 1.** *Collecting sites of ants in the United Arab Emirates*

Location	Longitude	Latitude	Habitat type	Date visited	Collector
Abu Dhabi	24°30'N	54°21'E	Park	7 Mar 1995	CAC
	24°29'N	54°19'E	Park	Feb 1995	VJS
Al Ain	24°14'N	55°41'E	Garden	2 Mar 1995	CAC
	24°15'N	55°48'E	Oasis	15 Mar 1995	CAC
	24°13'N	55°42'E	Town house	26 Feb 1995	VJS
	24°13'N	55°42'E	Urban area	6 Mar 1995	VJS
	24°13'N	55°40'E	Urban area	17 Mar 1995	CAC
	24°12'N	55°41'E	Zoological garden	2 Mar 1995	CAC
Al Mudam	24°56'N	55°48'E	Desert margin	29 Mar 1991	CG
Baynunah	24°21'N	52°19'E	Sandy desert	8 Mar 1995	CAC
Dubai	25°15'N	55°16'E	Garden	15 Apr 1991	CG
Jumeira	25°13'N	55°15'E	Garden	10 Feb 1996	VJS
Djebel Haffette	24°02'N	55°47'E	Rocky outcrop	4 Mar 1995	CAC
Hatta	24°49'N	55°09'E	Stony desert	12 Mar 1995	CAC
Khor Kalba	25°07'N	56°13'E	Coastal mangrove	30 Mar 1991	CG
Ras Ghanada	24°49'N	54°46'E	Coastal village	May 1993	BJT
	24°49'N	54°46'E	Coastal village	10 Mar 1995	CAC
Ras al Khaimah	25°47'N	56°00'E	Urban area	30 Mar 1991	CG
Remah	24°10'N	54°18'E	Hotel garden	10 Mar 1995	CAC
Ruwais	24°02'N	52°43'E	Desert margin	8 Mar 1995	CAC
	24°02'N	52°42'E	Town house	27 Feb 1995	CAC
	24°02'N	52°42'E	Town house	10 Mar 1995	DA
Sweihan	24°31'N	55°16'E	Park	13 Mar 1995	CAC
	24°24'N	52°19'E	Desert margin	1 Mar 1995	CAC

BJT=Barbara J. Tigar; CAC=Cedric A. Collingwood; CG=Christian Gross; DA=Donat Agosti; VJS=Vojin J. Slijivic.

*Monomorium indicum* Forel, 1902

*Distribution.* An Indian species that was repeatedly recorded in desert margins at NARC (Sweihan) and public gardens in Abu Dhabi and Ruwais, as well as domestic premises in Al Ain.

*Biology and ecology.* This species is of moderate size (2.5–3.5 mm long) and is a nuisance pest in houses, as well as one of the most dominant species in parks in UAE. Large colonies are established consisting of crater-shaped nests, often located around the base of buildings and entrances.

*Monomorium destructor* (Jerdan, 1851)

*Distribution.* The origin of this cosmopolitan species is unknown but it is well established throughout the Middle East (Collingwood, 1985). In UAE it is present in a surprisingly wide range of habitats, especially irrigated gardens and disturbed habitats close to water.

*Biology and ecology.* This species forms large colonies with several hundred workers. Individuals are small with a body length of between 1.5–2.5 mm. It can be a nuisance in and around houses and is known to destroy the insulation of electric cables.

*Pheidole teneriffana* Forel, 1893

*Distribution.* Of unknown origin, this ant is present throughout Arabia in parks and gardens. It occurs on many islands worldwide and is thought to be continually expanding its range. In UAE it was collected at Khor Kalba, Ras Ghanada, Ruwais, Remah and Sweihan.

*Biology and ecology.* Very populous in irrigated gardens and along the coast where it appears to be spreading rapidly, and might replace local species. Most workers are about 3 mm long, however there are also a few larger headed workers, about 5 mm long, that appear to act as guards.

*Solenopsis geminata* (Fabricius, 1804) (Common name: Fire ant)

*Distribution.* A Central American endemic that has been introduced into many countries including Cyprus, the Philippines and the U.S.A. It was collected for the first time in Arabia from Dubai.

*Biology and ecology.* This species is an aggressive predator, which probably alters the local fauna through both predation and competition for food. In the U.S.A. this species, together with the conspecific *S. invicta* (Buren), has dramatically changed the local ant and insect fauna. Its sting causes painful pustules and there is also a low risk of anaphylactic shock. It is an irritating nuisance to horses and cattle in the U.S.A. and poses a similar risk to racing horses and camels in UAE. The body length of workers varies from 3–7 mm.

*Tetramorium bicarinatum* (Nylander, 1846)

*Distribution.* A cosmopolitan tramp species often imported with plant material. It occurs throughout Asia and the New World, is well established in the Southern U.S.A. and may also occur in tropical Africa. The first record for Arabia is from a garden in Fujairah.

*Biology and ecology.* *Tetramorium bicarinatum* is probably a scavenger like most species of *Tetramorium* and probably has little impact on the local fauna. Although it forms large colonies it is not thought to pose a risk to public health. The body length of workers is about 3–3.5 mm.

#### *Dolichoderinae*

*Iridomyrmex anceps* (Roger, 1863)

*Distribution.* This species is widely distributed in India and also occurs in Iran (D.M. Lay, pers. comm.). The first records for Arabia were collected from several gardens and buildings in Al Ain.

*Biology and ecology.* This species favours man-made, mesic environments; however its status as a pest is doubtful. Workers range from 3.5–4.5 mm in body length.

*Linepithema humile* (Mayr, 1868) (formerly *Iridomyrmex humile*) (Common name: Argentine ant)

*Distribution.* It is a native of Argentina with a global distribution in temperate climates, especially Mediterranean-type ecosystems. Within the last 30 years it has spread at an enormous rate through Europe, western Australia and California. The first record for Arabia was from Al Ain.

*Biology and ecology.* Although they neither bite nor sting, these ants are very competitive and represent a major threat to local faunas because they are very efficient predators of invertebrates. They are small, about 2–3 mm long, and unicolonial with many queens and a huge number of nests which are non-aggressive among themselves. They extend their range by forming spreading colonies which act as a large front, with ants forming columns up to a centimetre wide which appear as a continuous, fast-moving stream. They are encouraged by the presence of irrigation. This species is easily recognized by its behaviour and its strong odour when crushed. It is not a serious household pest.

*Tapinoma simrothi* Krausse, 1911

*Distribution.* Widely distributed in the Mediterranean where it is one of the most common coastal species. Thought to be spreading but its distribution in Arabia is local. Found in parks in Al Ain and Abu Dhabi.

*Biology and ecology.* Little is known but this species is neither polydomous nor unicolonial and usually has two to three queens per colony. The body length of workers is about 3–3.5 mm.

*Tapinoma melanocephalum* (Fabricius, 1793)

*Distribution.* This is a globally distributed species in warm climate countries. It is a well established pest in some Arabian towns and has frequently been recorded from Oman (Collingwood & Agosti, 1996).

*Biology and ecology.* This ant is very small, about 1.5 mm long, and is almost invisible apart from its head which is seen as a black, fast moving dot. Sometimes it forms wide, loose columns on walls. It can be very abundant and often infests houses, where it

prefers sugary food sources. Some people suffer a slight, red irritation of the skin following contact with this ant.

### *Formicinae*

#### *Camponotus compressus* (Fabricius, 1787)

*Distribution.* A common Indian species which occurs in a wide range of ecosystems. The first record for Arabia is from Al Ain where many males and some queens were found under a packing crate.

*Biology and ecology.* This large, black ant feeds on aphids and often forms strong colonies with several hundred workers. Individuals range from 7–18 mm long. If it becomes well established, it could out-compete similar indigenous species, such as *Camponotus fellah* Dalla Torre, 1893 or *Camponotus xerxes* Forel, 1904. It is not normally recorded from houses.

#### *Paratrechina flavipes* (Smith, 1874)

*Distribution.* An oriental species of supposedly Japanese origin which has spread via imported plant material to U.S.A. It is often found in greenhouses in Europe. This ant has only recently been recorded in Arabia. It was found on several occasions in the UAE, for example parks in Al Ain and Abu Dhabi, Ras al Khaimah, Khor Kalba and Jumeira.

*Biology and ecology.* This species is not considered to be a pest although it is common in parks and gardens. Workers are small, with a body length of around 2.5 mm.

#### *Paratrechina jaegerskioeldi* Mayr, 1904

*Distribution.* Well known throughout the Middle East and probably distributed through plant material. The first records for the UAE are from gardens in Abu Dhabi and Al Ain, and from Khor Kalba.

*Biology and ecology.* This small ant, about 2.5 mm long, is a potential nuisance pest and is frequently reported in Arabia infesting human habitation, especially kitchens and bathrooms. It often occurs outside in irrigated and shaded areas.

#### *Paratrechina longicornis* (Latreille, 1802)

*Distribution.* A cosmopolitan species of unknown origin and probably the most widely distributed tramp ant. This species is well established on farms, oases and irrigated areas across Arabia. It was abundant in hotels' gardens and parks throughout the UAE including Ruwais, Al Ain and Al Mudam, and probably occurs in all irrigated areas.

*Biology and ecology.* This species generally lives outside although in temperate regions it sometimes occurs in warm houses. It is small, between 2.5–3 mm long, but very conspicuous because of its dark brown to black coloration. It is very fast moving and commonly forms wide but thinly populous trails up to 0.5 m wide over walls and floors.

### Discussion

The occurrence of so many tramp species, including five new records for Arabia, is alerting and points to a strong effect on the local fauna, especially in areas of high human impact. UAE might be expected to have fewer species than neighbouring Oman and Saudi Arabia because of its smaller size and strictly arid climate, but the paucity of records for the region makes comparisons difficult. However, the number of thermophile or heat-adapted, desert species recorded for UAE is less than a third of the entire Arabian ant fauna (Collingwood & Agosti, 1996) and the impact of introduced ant species may be more far-reaching because species diversity is initially low.

Some ants are particularly invasive. *Linepithema humile* is recorded from California, Portugal, Spain and southern France and has recently reached Genoa, Italy (V. Raineri, pers. com.). Its dominance where it occurs contrasts with its almost complete absence along the North African Mediterranean coast which is probably due to competition with *T. simrothi* (Bernard, 1976). Similarly, although it is widespread in western Australia, competition from local *Iridomyrmex* species is thought to prevent its spread into undisturbed habitats. In the UAE, *L. humile* probably does not compete directly with local ants for modified or disturbed habitats, as in California and western Australia (Ward, 1987), but may be better at establishing colonies in altered habitats. The negative effect of introduced species often goes unnoticed until it is too late to prevent their spread. For example, in Hawaii *L. humile* is considered a threat to local pollinators on which the endemic silversword (*Argyroxiphium* spp.) plants depend. Attempts at control are being suggested in the protected areas to which this rare plant is now confined (Woolliams, 1995). Insect pollinators are important for commercial crops and native plants alike.

The only ants which represent a serious danger to human health are *P. sennaarensis* and *S. geminata*. The former is well known to the local population, as suggested by its common name 'Samsun'. It does not sting unless seriously threatened but is a nuisance pest and frequently lives in gardens close to habitation. A species closely related to *S. geminata*, *S. invicta*, has successfully colonized the southern U.S.A., and has almost out-competed the entire local ant fauna, even altering the local insect diversity (das Gupta Jusino-Atresino & Phillips, 1994; Vinson, 1994). Its control has proved difficult, even in the technologically sophisticated and highly regulated U.S.A. (Williams, 1994). *Solenopsis geminata* could cause similar problems in UAE if it occurs more widely than currently known. The colonies found in Dubai have been the subject of a control programme by the local Public Health Department.

We know nothing about the origin of UAE's introduced ants or their subsequent development and spread. However, they now contribute about 20% of all ant species recorded in the UAE (D. Agosti, B. Tigar & C. Collingwood, unpublished data). Their occurrence is highly variable but they are most abundant in relatively mesic environments. Other ants recorded for the UAE are generally found in areas of natural or only slightly disturbed vegetation and introduced ants show an almost complete dominance in areas intensively used and modified by man. For example, during a 2-year study of ground dwelling invertebrates at five desert locations in Abu Dhabi Emirate 1246 records of ants were collected representing over 39,000 specimens, but no introduced species was recorded (Tigar & Osborne, in press). Man-altered habitats are still increasing in UAE, providing further opportunities for the invasion of successful cosmopolitan species of many animals and plants.

Although quarantine regulations can prevent the invasion of introduced species, boats still carry goods from Asia directly to the centre of Dubai. This city has many attractive, irrigated parks and gardens that would provide an easy foothold into Arabia for further invasive species. Local environmental departments should develop routine monitoring programmes for species such as the fire ant or they may enter unnoticed before their harmful effect on local ecology or public health is realized. Information on

Arabian entomofauna is still scarce and there is also a need for information on desert biodiversity in the light of considerable habitat alteration.

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