GLOBAL INVASIVE SPECIES DATABASE

FULL ACCOUNT FOR: ***Wasmannia auropunctata***

Wasmannia auropunctata 简体中文 正體中文

System: Terrestrial

Kingdom	Phylum	Class	Order	Family
Animalia	Arthropoda	Insecta	Hymenoptera	Formicidae

Common name

Rote Feuerameise (German), little fire ant (English), little introduced fire ant (English), little red fire ant (English), small fire ant (English), West Indian stinging ant (English), cocoa tree-ant (English, New Caledonia), pequena hormiga de fuego (Spanish), hormiga colorada (Spanish), hormiga roja (Spanish), formiga pixixica (Portuguese, Brazil), petit fourmi de feu (French), fourmi rouge (French), tsangonawenda (English, Gabon), sangunagenta (English, Gabon), satanica (Spanish, Cuba), hormiguilla (Spanish, Puerto Rico), albayalde (Spanish, Puerto Rico), formi électrique (French, New Caledonia), fourmi électrique (French, New Caledonia)

Synonym

Tetramorium auropunctatum , (Roger 1863)
Ochetomyrmex auropunctatum , (Forel 1886)
Ochetomyrmex auropunctata
Ochetomyrmex auropunctatus
Xiphomyrmex atomum , (Santschi 1914)
Wasmannia glabra , (Santschi 1931)
Hercynia panamana , (Enzmann 1947)

Similar species

Summary

Wasmannia auropunctata (the little fire ant) is blamed for reducing species diversity, reducing overall abundance of flying and tree-dwelling insects, and eliminating arachnid populations. It is also known for its painful stings. On the Galapagos, it eats the hatchlings of tortoises and attacks the eyes and cloacae of the adult tortoises. It is considered to be perhaps the greatest ant species threat in the Pacific region.

view this species on IUCN Red List

Species Description

Little fire ant (*Wasmannia auropunctata*) workers are monomorphic, which means they display no physical differentiation (Holway *et al*. 2002). The ants are typically small to medium-sized, with the workers ranging from 1-2mm (Holway *et al*. 2002). The little fire ant is light to golden brown in colour. The gaster is often darker. The pedicel, between the thorax and gaster, has two segments; the petiole and postpetiole. The petiole is \"hatchet-like,\" with a node that is almost rectangular in profile and higher than the postpetiole. The antenna have 11 segments, with the last two segments greatly enlarged into a distinct club. The antennal scape (the first segment) is received into a distinct groove (scrobe) that extends almost to the posterior border of the head. The thorax has long and sharp epinotal spines. The body is sparsely covered with long, erect hairs. This species is well-known for a painful sting, seemingly out of proportion to its size.
Please click on AntWeb: *Wasmannia auropunctata* for more images and assistance with identification. The AntWeb image comparison tool lets you compare images of ants at the subfamily, genus, species or specimen level. You may also specify which types of images you would like to comare: head, profile, dorsal, or label.
Please see the PaDIL (Pests and Diseases Image Library) species content page for Electric ant for high quality diagnostic and overview images.
Please follow this link for a fully illustrated Lucid key to common invasive ants [Hymenoptera: Formicidae] of the Pacific Island region [requires the most recent version of Java installed]. The factsheet on *Wasmannia auropunctata* contains an overview, diagnostic features, comparison charts, images, nomenclature and links. (Sarnat, 2008)

Notes

Bruneau de Miré (1969) reported *W. auropunctata* from the coastal region of Cameroon near Kribi, where cacao (*Theobroma cacao*) growers purposely transported *W. auropunctata* colonies from plantation to plantation as a biological control agent of certain insect pests, particularly Miridae (Hemiptera). (Bruneau de Miré 1969). In areas with *W. auropunctata*, populationsof most insects, including beetles, flies, and other ants, were reduced.In contrast, populations of plant-feeding bugs (Homoptera) that theants tends, such coccids and psyllids, increased (Bruneau de Miré, 1969 in Wetterer & Porter, 2003). Similarly MacFalane (1985 in Way & Bolton 1997) considered *W. auropunctata* useful as a natural enemy of crop pests in Solomon Islands (Wetterer & Porter, 2003).

Habitat Description

Invasive ants will usually readily invade disturbed habitats, such as forest edges or agricultural fields (Ness and Bronstein 2004). In natural environments the little fire ant (*Wasmannia auropunctata*) efficiently exploits twigs, leaf litter and for its nesting substrate, while in houses it may infest beds, furniture and food (Smith 1965, in Brooks and Nickerson 2000; Armbrecht and Ulloa-Chacón 2003). In some regions, nests are frequently found behind the sheaths of palms or palmettos. During heavy rains, nests may be moved into buildings or trees to escape flooding (Hedges 1998, in Brooks and Nickerson 2000).\n
Cold climates appear to be unsuitable for the successful invasion and establishment of *W. auropunctata* in native ecosystems. However, it may survive in human habitations or infrastructures including climate-controlled buildings and greenhouses. For example, *W. auropunctata* is a greenhouse pest in temperate regions, such as England and Canada. Although local spread is restricted in such cases, the population may act as a “stepping stone” for the colonisation of more suitable locations (*via* long distance spread) (McGlynn 1999; Holway *et al*. 2002; J. K. Wetterer pers. comm., 2003).

Nutrition

Invasive ants typically have a generalised feeding regime and are able to gain nutrition from a variety of sources including grains, seeds, arthropods, decaying matter and vegetation (Holway *et al*. 2002; Ness and Bronstein 2004). Specialised feeders, such as army ants, which prey on other social insects, are less likely than the little fire ant (*Wasmannia auropunctata*) to be successful in introduced regions as the range of potential prey is smaller (McGlynn 1999).
Little fire ants are omnivores and are very flexible in their diet, preying on invertebrates and consuming plant parts (Romanski 2001). When honeydew-producing Homoptera are present, a large part of its diet is likely to consist of the carbohydrate-rich residues produced by these insects (J. K. Wetterer pers. comm., 2003). In human habitations, nutrition may be gained from fats (such as peanut butter) and other oily materials found in homes (Fernald 1947, in Brooks and Nickerson 2000). The little fire ant has a venomous sting that gives it a greater ability to subdue vertebrate and large invertebrate prey (Holway *et al*. 2002).

General Impacts

Environmental stresses (such as those caused by human practices, such as monoculture) may cause explosions of some ant populations, an effect that is particularly evident within ants' native ranges. For example, in its native range in South America, the little fire ant *Wasmannia auropunctata* is a pest in disturbed forests and agricultural areas where it can reach high densities. High densities of *W. auropunctata* have been linked with sugar cane monocultures and cocoa farms in Colombia and Brazil, respectively. In Colombia, a high abundance of the little fire ant in forest fragments has been linked with low ant diversity. The little fire ant efficiently exploits resources including nectar, refuges within vegetation and honeydew residues (of Homopteran insects), and it may out-compete and displace native myrmecofauna (Armbrecht and Ulloa-Chacón 2003). Improved land management and a reduction of primary production will alleviate the problems associated with invasive ants and the environmental stresses that cause ant population explosions. \r\n
In agricultural areas, due to the close association of the land and workers, the little fire ant may be a great nuisance to humans. This is because it is more likely to reach high densities and sting people working in the field. The increased numbers of Homoptera insects, which sap plant nutrients and make plants susceptible to disease, may cause substantial yield losses. In Cameroon, on the other hand, the spread of the little fire ant is encouraged, due to the fact that it preys on, and thereby has a role in the control of, certain herbivorous cocoa pests (Bruneau de Mire 1969, in Brooks and Nickerson 2000).
W. auropunctata may have negative impacts on invertebrates and vertebrates. They may prey on native insects and cause declines in the numbers of small vertebrates. In human habitations it may sting, and even blind, domestic pets (cats and dogs) (Romanski 2001). It is believed to have caused a decrease in reptile populations in New Caledonia and in the Galapagos Archipelago, where it eats tortoise hatchlings and attacks the eyes and cloacae of the adult tortoises (Holway *et al*. 2002; J. K. Wetterer pers. comm., 2003). The little fire ant is probably the most aggressive species that has been introduced into the Galapagos archipelago, where a marked reduction of scorpions, spiders and native ant species in infested areas has been observed (Lubin 1984, Clark *et al*. 1982, in Roque-Albelo and Causton 1999). Similarly it has been noted to decrease local arthropod biodiversity in the Solomon Islands (Romanski 2001).
W. auropunctata rarely buries myrmecochorous seeds and sometimes ingests elaisomes without dispersing seed. In its native range, the little fire ant decreases herbivorous arthropod biodiversity, increasing the fruit and seed production and growth of the plant and decreasing pathogen attacks. *W. auropunctata* may also, however, exclude arthropod plant mutualists, such as plant tenders or seed dispersers (Ness and Bronstein 2004).
Please read Invasive ants impacts for a summary of the general impacts of invasive ants, such as their affect on mutualistic relations, the competitive pressure they impose on native ants and the effect they may have on vulnerable ecosystems.

Management Info
Preventative measures: The Pacific Ant Prevention Programme is a proposal prepared for the Pacific Plant Protection Organisation and Regional Technical Meeting For Plant Protection. This plan aims to prevent the red imported fire ant and other invasive ant species with economic, environmental and/or social impacts, entering and establishing in or spreading between (or within) countries of the Pacific Region.\n
A detailed pest risk assessment for the eight species ranked as having the highest potential risk to New Zealand was prepared as part of 'The invasive ant risk assessment project', Harris *et al.* 2005., for Biosecurity New Zealand by Landcare Research. The Invasive ant risk assessment for *Wasmannia auropunctata* can be viewed at *Wasmannia auropunctata* risk assessment. Please see *Wasmannia auropunctata* information sheet for more information on biology, distribution, pest status and control technologies. \r\n
Integrated management: The potential of invasive ants to reach high densities is greater in ecosystems which have been utilised or modified by humans. For example the little fire ant is a greater problem in forests and habitats in its native range in South America that have been over-exploited by humans (Armbrecht and Ulloa-Chacón 2003). In south Colombia and Brazil, respectively, sugarcane monocultures and cocoa farms have been linked with high abundances of the little fire ant. Similarily, the Argentine ant (*Linepithema humile*) reaches locally high densities in agricultural systems, particularly citrus orchards, which host honey-dew producing Homoptera (Armbrecht and Ulloa-Chacón 2003; Holway *et al*. 2002). This implies that improved land management (including improving land use efficiency and reducing the practice of monoculture) and a reduction in primary production would reduce numbers of invasive ants, alleviate the problems associated with high densities of invasive ants and reduce the potential sources from new infestations. \r\n
Chemical: Eradication programmes are expected to be more successful on small islands or in isolated areas where distributions are less than a few dozen hectares. In the Galapagos Archipelago, it may be impossible to eradicate *W. auropunctata* from the large islands where it is established. However it has been successfully eradicated from Santa Fe and has the potential to be eradicated from other small islands such as Marchena. The control of the little fire ant on these islands has been by non-selective ant poisons, fire, or by clearing vegetation (Roque-Albelo and Causton 1999, Roque-Albelo and Causton 1999).\n
Please follow this link for more detailed information on the management of *Wasmannia auropunctata* compiled by the ISSG.

Pathway
Used as a biological control agent on plantations in Gabon and Cameroon (Bruneau de Mire 1969, in Brooks and Nickerson 2000).*W. auropunctata* was likely to have been transported between the large islands in the Galapagos archipelago on plants and in soil, and between the small islands on camping provisions and equipment (Roque-Albelo and Causton 1999).Growing military and commercial activity may have facilitated the increased spread of ants into the Pacific region over the last century. Commerce to and from islands must be watched more closely than exchanges between two continental areas because ants are more abundant on islands and are more likely to establish on new islands (due to higher ecological vulnerability of island ecosystems) (McGlynn 1999).Invasive ant species that are known to associate closely with humans and nest in nursery stock or other products traded locally or globally have the potential to be spread long distances by humans (Holway *et al*. 2002). Little fire ants are commonly associated with and distributed by humans. Nurseries, fruit tree orchards, and ornamental plants are all potential habitat for the LFA. Since these ants have an affinity for nesting at tree bases and in potted plants, they are especially easily spread between plant nurseries. When contaminated plants are purchased and planted, the ants may become locally established (Romanski 2001).May be spread by the movement of logs and lumber products infested with the ant. It may be spread within the Solomon Islands by the movement of coconuts.May be spread by the movement of logs and lumber products infested with the ant. It may be spread within the Solomon Islands by the movement of coconuts. *W. auropunctata* was likely to have been transported between the large islands in the Galapagos archipelago on plants and in soil, and between the small islands on camping provisions and equipment (Roque-Albelo and Causton 1999).May be spread by the movement of logs and lumber products infested with the ant. It may be spread within the Solomon Islands by the movement of coconuts.In Cameroon the spread of the little fire ant in cocoa plantations is encouraged due to the fact that it preys on, and thereby has a role in the control of, certain herbivorous cocoa pests (Bruneau de Mire 1969, in Brooks and Nickerson 2000).

Principal source:

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Review:

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ALIEN RANGE

[1] AUSTRALIA
[1] BAHAMAS
[1] BERMUDA
[1] CAMEROON
[4] CANADA
[1] COOK ISLANDS
[1] COSTA RICA
[4] ECUADOR
[1] FIJI
[3] FRENCH POLYNESIA
[1] GABON
[1] GUAM
[1] ISRAEL
[4] NEW CALEDONIA
[1] NEW ZEALAND
[1] PAPUA NEW GUINEA
[7] SOLOMON ISLANDS
[1] TUVALU
[1] UNITED KINGDOM
[14] UNITED STATES
[4] VANUATU
[2] WALLIS AND FUTUNA

Red List assessed species 98: CR = 32; EN = 20; VU = 15; NT = 10; DD = 7; LC = 14;

Bavayia crassicollis **DD**
Bavayia cyclura **DD**
Bavayia exsuccida **EN**
Bavayia geitaina **NT**
Bavayia goroensis **EN**
Bavayia montana **DD**
Bavayia ornata **EN**
Bavayia pulchella **NT**
Bavayia robusta **NT**
Bavayia sauvagii **DD**
Bavayia septuiclavis **NT**
Bulimulus achatellinus **CR**
Bulimulus adelphus **CR**
Bulimulus adserseni **CR**
Bulimulus albermalensis **DD**
Bulimulus calvus **VU**
Bulimulus chemitzioides **CR**
Bulimulus cinerarius **EN**
Bulimulus darwini **VU**
Bulimulus eos **CR**
Bulimulus eschariferus **CR**
Bulimulus galapaganus **CR**
Bulimulus habeli **CR**
Bulimulus indefatigabilis **CR**
Bulimulus jacobi **CR**
Bulimulus lycodus **CR**
Bulimulus nesioticus **VU**
Bulimulus nucula **DD**
Bulimulus nux **EN**
Bulimulus ochsneri **CR**
Bulimulus olla **EN**
Bulimulus saeronius **CR**
Bulimulus sculpturatus **CR**
Bulimulus sp. nov. 'josevillani' **CR**
Bulimulus sp. nov. 'krameri' **CR**
Bulimulus sp. nov. 'nilsodhneri' **CR**
Bulimulus sp. nov. 'tuideroyi' **CR**
Bulimulus sp. nov. 'vanmoli' **CR**
Bulimulus unifasciatus **VU**
Bulimulus wolfi **CR**
Caledoniscincus aquilonius **NT**
Caledoniscincus atropunctatus **LC**
Caledoniscincus auratus **EN**
Caledoniscincus austrocaledonicus **LC**
Caledoniscincus bodoi **LC**
Caledoniscincus chazeaui **EN**
Caledoniscincus cryptos **DD**
Caledoniscincus festivus **LC**
Caledoniscincus haplorhinus **LC**
Caledoniscincus orestes **EN**
Caledoniscincus renevieri **EN**
Caledoniscincus terma **VU**
Celatiscincus euryotis **EN**
Celatiscincus similis **EN**
Cryptoblepharus novocaledonicus **LC**
Dierogekko inexpectatus **CR**
Dierogekko insularis **NT**
Dierogekko kaalaensis **CR**

Dierogekko koniambo **CR**
Dierogekko nehoueensis **CR**
Dierogekko poumensis **CR**
Dierogekko thomaswhitei **CR**
Dierogekko validiclavis **EN**
Emoia loyaltiensis **VU**
Eurydactylodes agricolae **NT**
Eurydactylodes occidentalis **CR**
Eurydactylodes symmetricus **EN**
Eurydactylodes vieillardi **NT**
Geoscincus haraldmeieri **CR**
Graciliscincus shonae **VU**
Kanakysaurus viviparus **EN**
Kanakysaurus zebratus **EN**
Lioscincus nigrofasciolatum **LC**
Lioscincus novaecaledoniae **LC**
Lioscincus tillieri **NT**
Marmorosphax tricolor **LC**
Nannoscincus exos **CR**
Nannoscincus gracilis **VU**
Nannoscincus greeri **EN**
Nannoscincus hanchisteus **CR**
Nannoscincus humectus **EN**
Nannoscincus manautei **CR**
Nannoscincus mariei **VU**
Nannoscincus slevini **EN**
Oedodera marmorata **CR**
Partula hyalina **VU**
Phoboscincus garnieri **LC**
Rhacodactylus auriculatus **LC**
Rhacodactylus chahoua **VU**
Rhacodactylus ciliatus **VU**
Rhacodactylus leachianus **LC**
Rhacodactylus sarasinorum **VU**
Rhacodactylus trachyrhynchus **EN**
Sigaloseps deplanchei **NT**
Simiscincus aurantiacus **VU**
Tropidoscincus aubrianus **VU**
Tropidoscincus boreus **LC**
Tropidoscincus variabilis **LC**

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68 references found for **Wasmannia auropunctata**

Managment information
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AntWeb, 2006. *Wasmannia auropunctata*
Summary: AntWeb illustrates ant diversity by providing information and high quality color images of many of the approximately 10,000 known species of ants. AntWeb currently focusses on the species of the Nearctic and Malagasy biogeographic regions, and the ant genera of the world. Over time, the site is expected to grow to describe every species of ant known. AntWeb provides the following tools: Search tools, Regional Lists, In-depth information, Ant Image comparision tool PDF field guides maps on AntWeb and Google Earth and Ant genera of the world slide show.
AntWeb is available from: http://antweb.org/about.jsp [Accessed 20 April 2006]
The species page is available from:
http://antweb.org/getComparison.do?rank=species&genus=wasmannia&name=auropunctata&project=&project= [Accessed 2 May 2006]
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Summary: Available from: http://www.fcla.edu/FlaEnt/fe88p159.pdf [Accessed 21 October 2008]
Commonwealth of Australia. 2006a. Threat abatement plan to reduce the impacts of tramp ants on biodiversity in Australia and its territories, Department of the Environment and Heritage, Canberra.
Summary: This plan establishes a national framework to guide and coordinate Australia�s response to tramp ants, identifying the research, management, and other actions necessary to ensure the long term survival of native species and ecological communities affected by tramp ants. It identifies six national priority species as an initial, but flexible, list on which to focus attention. They are the red imported fi re ant (*Solenopsis invicta*), tropical fire ant (*S. geminata*), little fire ant (*Wasmannia auropunctata*), African big-headed ant (*Pheidole megacephala*), yellow crazy ant (*Anoplolepis gracilipes*), and Argentine ant (*Linepithema humile*).
Available from: http://www.environment.gov.au/biodiversity/threatened/publications/tap/pubs/tramp-ants.pdf [Accessed 17 November 2009]
Commonwealth of Australia. 2006b. Background document for the threat abatement plan to reduce the impacts of tramp ants on biodiversity in Australia and its territories, Department of the Environment and Heritage, Canberra.
Summary: This background document to the Threat abatement plan to reduce the impacts of tramp ants on biodiversity in Australia and its territories provides supporting information on a range of issues such as tramp ant biology, population dynamics, spread, biodiversity impacts and management measures.
Available from: http://www.environment.gov.au/biodiversity/threatened/publications/tap/pubs/tramp-ants-background.pdf [Accessed 17 November 2009]
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Summary: Available from: http://www.dpi.qld.gov.au/cps/rde/xchg/dpi/hs.xsl/4790_5772_ENA_HTML.htm [Accessed 25 February 2008]
Department of the Environment and Heritage (DEH), 2005. Draft Threat Abatement Plan for for Reduction in Impacts of Tramp Ants on Biodiversity in Australia and its Territories
Formis: A Master Bibliography of Ant Literature. USDA, Agricultural Research Service.

Fourmi de feu a Tahiti (in French)
Summary: Webpage created to centralise information on the *Wasmannia auropunctata* invasion in Tahiti. Contains an assessment of the situation, images, maps, scientific documents, links and contacts.
Harris, R.; Abbott, K.; Barton, K.; Berry, J.; Don, W.; Gunawardana, D.; Lester, P.; Rees, J.; Stanley, M.; Sutherland, A.; Toft, R. 2005: Invasive ant pest risk assessment project for Biosecurity New Zealand. Series of unpublished Landcare Research contract reports to Biosecurity New Zealand. BAH/35/2004-1.
Summary: The invasive ant risk assessment project, prepared for Biosecurity New Zealand by Landcare Research, synthesises information on the ant species that occur in New Zealand (native and introduced species), and on invasive ants that pose a potential threat to New Zealand.
There is a great deal of information in this risk assessment on invasive ant species that is of global interest, including; biology, distribution, pest status, control technologies.
The assessment project has five sections.1) The Ants of New Zealand: information sheets on all native and introduced ants established in New Zealand 2) Preliminary invasive ant risk assessment: risk scorecard to quantify the threat to New Zealand of 75 ant species. 3) Information sheets on invasive ant threats: information sheets on all ant species scored as medium to high risk (n = 39). 4) Pest risk assessment: A detailed pest risk assessment for the eight species ranked as having the highest potential risk to New Zealand (*Anoplolepis gracilipes*, *Lasius neglectus*, *Monomorium destructor*, *Paratrechina longicornis*, *Solenopsis geminata*, *Solenopsis richteri*, *Tapinoma melanocephalum*, *Wasmannia auropunctata*) 5) Ranking of high risk species: ranking of the eight highest risk ant species in terms of the risks of entry, establishment, spread, and detrimental consequences.
NB. The red imported fire ant (*Solenopsis invicta*) is considered to be the worst ant pest in the world. However, *Solenopsis invicta* was specifically excluded from consideration in this risk assessment as this species has already been subject to detailed consideration by Biosecurity New Zealand
(This invasive ant pest risk assessment was funded by Biosecurity New Zealand and Foundation for Research, Science and Technology. Undertaken by Landcare Research in collaboration with Victoria University of Wellington and Otago Museum)
Available from: http://www.landcareresearch.co.nz/research/biocons/invertebrates/Ants/ant_pest_risk.asp [Accessed 20 May 2007]
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Nishida, G. M. and Evenhuis, N. L. 2000. Arthropod pests of conservation significance in the Pacific: A preliminary assessment of selected groups. In Invasive Species in the Pacific: A Technical Review and Draft Regional Strategy. South Pacific Regional Environment Programme, Samoa: 115-142.
Summary: Discusses over a dozen of the worst arthropod pests in the South Pacific, with particular emphasis on ants and their control and management.
Pacific Ant Prevention Programme, March 2004. Pacific Invasive Ant Group (PIAG) on behalf of the IUCN/SSC Invasive Species Specialist Group (ISSG).
Summary: A proposal prepared for the Pacific Plant Protection Organisation and Regional Technical Meeting For Plant Protection. This plan aims to prevent the red imported fire ant and other invasive ant species with economic, environmental and/or social impacts, entering and establishing in or spreading between (or within) countries of the Pacific Region.
Roque, Albelo L., Causton, C. E. and Mieles, A. 2000. The ants of Marchena Island, twelve years after the introduction of the little fire ant, *Wasmnnia auropunctata*. Noticias de Galápagos.
Sarnat, E. M. (December 4, 2008) PIAkey: Identification guide to ants of the Pacific Islands, Edition 2.0, Lucid v. 3.4. USDA/APHIS/PPQ Center for Plant Health Science and Technology and University of California � Davis.
Summary: PIAkey (Pacific Invasive Ant key) is an electronic guide designed to assist users identify invasive ant species commonly encountered in the Pacific Island region. The guide covers four subfamilies, 20 genera and 44 species.
The primary tool offered by PIAkey is an interactive key designed using Lucid3 software. In addition to being fully illustrated, the Lucid key allows users to enter at multiple character points, skip unknown characters, and find the most efficient path for identifying the available taxa. Each species is linked to its own web page. These species pages, or factsheets, are linked to an illustrated glossary of morphological terms, and include the following seven sections: 1) Overview of the species; 2) Diagnostic chart illustrating a unique combination of identification characters; 3) Comparison chart illustrating differences among species of similar appearance; 4) Video clip of the species behavior at food baits (where available); 5) Image gallery that includes original specimen images and live images (where available); 6) Nomenclature section detailing the taxonomic history of the species, and 7) Links and references section for additional literature and online resources.
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