GLOBAL INVASIVE SPECIES DATABASE

FULL ACCOUNT FOR: ***Solenopsis geminata***

Solenopsis geminata **System:** Terrestrial

Kingdom	Phylum	Class	Order	Family
Animalia	Arthropoda	Insecta	Hymenoptera	Formicidae

Common name

Feuerameise (German), fire ant (English), tropical fire ant (English), ginger ant (English), aka-kami-ari (Japanese)

Synonym

Myrmica polita , (Smith)
Solenopsis cephalotes , (Smith)
Atta clypeata , (Smith)
Atta coloradensis , (Buckley)
Solenopsis eduardi , (Forel)
Solenopsis geminata , var. *galapageia* (Wheeler)
Myrmica glaber , (Smith)
Solenopsis geminata , var. *innota* (Santschi)
Crematogaster laboriosus , (Smith)
Myrmica laevissima , (Smith)
Atta lincecumii , (Buckley)
Solenopsis mandibularis , (Westwood)
Solenopsis geminata , subsp. *Medusa* (Mann)
Myrmica mellea , (Smith)
Solenopsis geminata , var. *nigra* (Forel)
Myrmica paleata , (Lund)
Atta rufa , (Jerdon)
Myrmica (Monomorium) saxicola , (Buckley)
Diplorhoptrum drewseni , (Mayr)
Solenopsis edouardi , var. *perversa* (Santschi)
Solenopsis edouardi , var. *bahiaensis* (Santschi)
Solenopsis germinata , var. *diabola* (Wheeler)

Similar species

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Summary

Solenopsis geminata has spread almost world-wide by human commerce. It usually invades open areas but can easily colonise human infrastructure and agricultural systems, such as coffee and sugarcane plantations in hot climates. Its greatest known threats are its painful sting and the economic losses due to crop damage caused by its tending of honeydew-producing insects. Solenopsis geminata is known to reduce populations of native butterfly eggs and larvae. It has the potential to displace native ant populations, but is susceptible to competitive pressures from some other ant species.

view this species on IUCN Red List

Species Description
Solenopsis spp. workers are polymorphic, physically differentiated into more than two forms (Holway *et al*. 2002). Their total body length ranges from 3 to 5mm long. The body is an orange to brown colour and the head is brown. Major workers are characterised by the following traits: head almost square, posterodorsal margin distinctly convex in frontal view; mandibles robust, each with a strongly convex outer margin and 4 blunt teeth on the masticatory margin; mandibular teeth obscure in some individuals; clypeus with a pair of longitudinal carinae; eyes rather small, each with more than 20 facets; anterior ocelli often present; antennal scapes reaching nearly to posterior border of head; antennal club longer than the 3rd to 9th antennal segments combined; legs, mesosoma and gaster with numerous erect hairs. Minor workers are characterised by the following traits: head almost square in frontal view; mandibles 4-toothed; antennal scapes reaching posterior margin of head; clypeus with a pair of longitudinal carinae; posterolateral corners of propodeum carinate, the carinae reaching the dorsal surface of the propodeum; subpetiolar process absent.
Please click on *AntWeb: Solenopsis geminata* 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 PaDIL (Pests and Diseases Image Library) Species Content Page *Ants: Tropical Fire 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 *Solenopsis geminata* contains an overview, diagnostic features, comparision charts, images, nomenclature and links. (Sarnat, 2008)

Notes
Some ants are thought to be invasive largely due to their colony structure and social characteristics. Uniclonal colonies are characterised by the inclusion of a multiple number of nests (polydomy) and by the co-operation of the workers to provide for many queens (polygyny). This confers many advantages for the survival and reproduction of an ant colony. In contrast ants with a monogynous monodomous colony structure (with workers attending to a single queen and nest) are less able to colonise a new location rapidly (McGlynn 1999). \r\n
In introduced regions tropical fire ants may be either multiclonal, with workers defending one queen and exhibiting high intranest aggression, or uniclonal. In the latter case workers lack internest aggression and work co-operatively as a supercolony to recruit new food items quickly. As a consequence ants are more likely to reach high local densities and dominate entire habitats (Ness and Bronstein 2004; McGlynn 1999).

Lifecycle Stages
Solenopsis geminata undergoes the following metamorphosis. Eggs are laid by the queen that will hatch to produce soft larvae, which are feed from regurgitated oils produced by the queen. During the last larvae stages, the larvae are feed solid foods, as opposed to only receiving liquid nutrients. Apparently the larvae are able to digest various proteins (due to their production of specific digestive enzymes) that cannot be digested by worker ants. The products of digestion are regurgitated by the larvae to passed along to the queen, in whom they stimulate the production of eggs. The larvae then develop into pupae, which are tended by workers. Newly emerged small adult workers spend several days to weeks taking care of eggs, larvae, pupae, and the queen. They open the burrow (in order to locate and gather food sources), feed the queen and the larvae, and construct the nest. Older workers groom the larvae, defend the colony, help to build and maintain the nest and carry back to the nest nutrients obtained from food sources. The oldest ants, the foragers, scavenge for food sources and lay chemical trails for the reserves to follow (back and forth from a food sources).

Habitat Description
Solenopsis geminata is classified as a “hot climate specialist” as it resides only within hot arid regions. Native habitats in cold climates are unsuitable for successful colonisation by *S. germinata*. However it may survive in climate-controlled buildings, greenhouses or other human dwellings and infrastructure. In such cases, although its capacity for local spread is restricted its continued presence facilitates long distance dispersal to locations more suitable for establishment (McGlynn 1999; Holway *et al*. 2002). \r\n
Like many other invasive ants the topical fire ant will more readily invades disturbed habitats such as forest edges or agricultural crops (Ness and Bronstein 2004). For example, in Kakadu National Park, Australia, infestations of this ant were found only at sites located near areas frequented by humans, including within the grounds of a tourist complex. The ant did not penetrate the surrounding undisturbed savanna habitat, despite the production of alates (winged ants) that enabled sufficient dispersal into such areas (Hoffmann and O’Connor 2004). A study conducted in coffee plantations in Costa Rica by Perfecto and Vandermeer (1996) showed *S. geminata* abundance decreased with increasing shade conditions. The authors stipulate this to be a direct affect of the increased abundance of other ant species in shaded habitats (and the increased competitive pressure) rather than the light variable itself.

Reproduction
During warm months winged individuals are found in large numbers in mature colonies. New colonies are individually established by solitary fertile queens following a mating flight. Queens seek moist areas within a few kilometres of the parent colony. Once a suitable site is found the female sheds her wings and digs a small burrow into the soil and seals it. She will lay around 10 to 15 eggs each day for up to 10 days after which she will stop laying eggs until the workers are mature (which may take two weeks to a month). The colony may eventually consist of a few queens, many winged males, winged virgin females and a group of soldiers and workers in graduating sizes. Colony “budding” may occur, resulting in the outwars radiation of a colony.

Nutrition
Invasive ants are typically have a generalised feeding regime, able to gain nutrition from a variety of sources including grains, seeds, arthropods, decaying matter and/or vegetation (Holway *et al*. 2002; Ness and Bronstein 2004). Specialised feeders such as army ants, which prey on other social insects, are less likely to be successful in introduced regions as the range of potential prey is smaller (McGlynn 1999).
the diet of *S. geminata* includes a high proportion of seeds (Holway *et al*. 2002). It feeds and gathers grass seeds, storing them in “granaries” in their large nests (which may extend a metre and a half into the ground). They also tend honeydew producing homoptera and feed on arthropods (including a number of insect pests). *S. geminata* prefers food with a high protein content but will feed on almost anything, including many human foods rich in carbohydrates or fats. *S. geminata* possess a venomous sting that gives it an ability to subdue relatively large invertebrate prey, and even small vertebrates (Holway *et al*. 2002).

General Impacts
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. \r\n
S. geminata presents a grave threat to conservation values where it invades native communities. In terms of ecosystem disruption there is evidence that *S. geminata* reduces populations of native butterfly eggs and larvae on Guam (SPREP). It is also known to have the potential to devastate native ant populations (McGlynn 1999). *S. germinata* may consume some myrmecochorous seeds, but there is conflicting evidence; it certainly does not usually bury myrmecochorous seeds and will ingest the elaisome without dispersing the seed. It may have negative effects on some plant life, for example, it excludes ants that disperse the seeds of the plant *Calathea ovandensis* and defend the plant from herbivorous arthropods (Ness and Bronstein 2004).
Because *S. germinata* tends honeydew producing insects it may instigate population explosions in populations in insects such as mealybugs or other crop pests. This also results in an increase in the incidences of any plant disease transmitted by such pests. For example, in Northern monsoonal Australia it is now a major domestic and agricultural pest. It is known to chew through plastic tubing, and because of this may cause great damage to irrigation systems.\r\n
Fire ants are most notorious for their stinging behaviour. They respond rapidly and aggressively to any disturbance of the colony or to a food source. A single fire ant can sting repeatedly and will continue to do so even after their venom sac has been depleted. Initially, the sting results in a localized intense burning sensation (hence the name \"fire\" ant). This is followed the reddening and swelling of the surrounding skin tissue. In some people the sting may cause a severe, systemic allergic reaction.

Management Info
Preventative measures: Effective quarantine measures, continuous monitoring, and immediate response upon finding newly established populations may be more effective than attempting to eradicate established species. The early detection of ant infestations is essential for cost-effective successful eradication and to prevent the formation of large uncontrollable infestations. In Kakadu National Park, Australia, detection was facilitated by the conspicuous soil workings and waste piles of the ant, which differs from those of native ant species. In addition, visual inspection could be achieved by easy means as ants rapidly recruited to any food source, regardless of the lack of specialised attractants. Following the eradication of this ant from the park all major tourist stops along the roads leading to the park were inspected for ants in order to reduce the risk of re-invasion (Hoffmann and O'Connor 2004).
\r\n*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.
A detailed pest risk assessment for the eight species ranked as having the highest potential risk to New Zealand (\r\n*Anoplolepis gracilipes*, *Lasius neglectus*, *Monomorium destructor*, *Paratrechina longicornis*, *Solenopsis geminata*, *Solenopsis richteri*, *Tapinoma melanocephalum*, *Wasmannia auropunctata*) 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 *Solenopsis geminata* can be viewed at *Solenopsis geminata risk assessment*\r\n
Please see *Solenopsis geminata information sheet* for more information on biology, distribution, pest status and control technologies.\r\n
Chemical: Chemical control of *S. geminata* is very easy using baits laced with the active constituent, hydramethylnon (*Notes on the control of Solenopsis spp.*).
Small infestations of *S. geminate* can be eradicated by the application of chemicals such as hydramethylnon (for example, applied as the commercially available formicide Amdro®). Hydramethylnon is a stomach toxicant spread between individuals in a colony by trophylaxis. The toxin is highly soluble and harms aquatic invertebrates. Care must be taken when considering its use in ecologically sensitive areas, irrigated areas or near natural water ways. The toxin must also be applied during dry weather to ensure success. Most ants killed within 24 h and the toxin is passed to the queens, usually effectively killing the whole colony. It has been used widely in the Northern Territory of Australia for the control of the tropical fire ant and has successfully eradicated infestations of the ant in Kakadu National Park, Australia (Hoffmann and O'Connor 2004).

Pathway
Argricultural areas with fire ant infestations are a potential source of infestation (with a high risk of spread associated with such areas due to the movement of produce).Movement of materials out of any fire ant infested areas in any form of transportation risks spread of the ant.Spread into new countries *via* the trade of materials infested with fire ants may be the cause of new introductions of such ants into a country.Fire ants may infest potplants, meaning the movement of plants out of infected areas carries a high risk potential in terms of dispersing the ant to new locations.The movement of vegetative material or soil associated with agricultural land infested by fire ants may result in the introduction of ants into new areas.Within the world heritage site of Kakadu National Park, Australia, *S. geminata* and *Pheidole megacephala* were detected only at sites located near areas frequented by humans (including a t

Principal source:

Compiler: IUCN/SSC Invasive Species Specialist Group (ISSG) with support from the Ministry of Agriculture and Forestry (MAF)- Biosecurity New Zealand
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ALIEN RANGE

[1] AFRICA
[1] ANTIGUA AND BARBUDA
[5] AUSTRALIA
[1] BARBADOS
[1] CAROLINE ISLANDS
[1] COOK ISLANDS
[1] FIJI
[1] GUAM
[2] INDONESIA
[2] KIRIBATI
[1] MALAYSIA
[1] MYANMAR
[1] NEW ZEALAND
[1] PAPUA NEW GUINEA
[1] REUNION
[1] SOUTH AFRICA
[1] SRI LANKA
[1] TONGA
[1] TURKS AND CAICOS ISLANDS
[1] UNITED KINGDOM
[1] UNITED STATES MINOR OUTLYING ISLANDS
[1] VIRGIN ISLANDS, BRITISH
[1] AMERICAN SAMOA
[1] ARGENTINA
[1] BAHAMAS
[1] CANADA
[2] CHINA
[2] ECUADOR
[1] FRENCH POLYNESIA
[1] INDIA
[1] JAPAN
[1] LIBERIA
[1] MARSHALL ISLANDS
[1] NEW CALEDONIA
[1] NORTHERN MARIANA ISLANDS
[1] PHILIPPINES
[1] SOLOMON ISLANDS
[1] SOUTH EAST ASIA
[1] TAIWAN
[1] TRINIDAD AND TOBAGO
[1] UNITED ARAB EMIRATES
[2] UNITED STATES
[1] VIET NAM
[1] VIRGIN ISLANDS, U.S.

Red List assessed species 2: CR = 1; EN = 1;

Camarhynchus heliobates **CR**

Spheniscus mendiculus **EN**

BIBLIOGRAPHY

38 references found for **Solenopsis geminata**

Managment information
AntWeb, 2006. *Solenopsis geminata*
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=solenopsis&name=geminata&project=&project= [Accessed 2 May 2006]
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]
Graham, R. 2006. Tropical Fire Ant (*Solenopsis geminata*) Pest and Diseases Image Library. Updated on 29/08/2006 12:05:34 PM.
Summary: PaDIL (Pests and Diseases Image Library) is a Commonwealth Government initiative, developed and built by Museum Victoria s Online Publishing Team, with support provided by DAFF (Department of Agriculture, Fisheries and Forestry) and PHA (Plant Health Australia), a non-profit public company. Project partners also include Museum Victoria, the Western Australian Department of Agriculture and the Queensland University of Technology. The aim of the project is: 1) Production of high quality images showing primarily exotic targeted organisms of plant health concern to Australia. 2) Assist with plant health diagnostics in all areas, from initial to high level. 3) Capacity building for diagnostics in plant health, including linkage developments between training and research organisations. 4) Create and use educational tools for training undergraduates/postgraduates. 5) Engender public awareness about plant health concerns in Australia. PaDIL is available from : http://www.padil.gov.au/aboutOverview.aspx, this page is available from: http://www.padil.gov.au/viewPestDiagnosticImages.aspx?id=182 [Accessed 30 May 2006]
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]
Hoffmann, Benjamin D and O Connor, Simon., 2004. Eradication of two exotic ants from Kakadu National Park. Ecological Management & Restoration, August 2004, vol. 5, no. 2, pp. 98-105(8)
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IUCN/SSC Invasive Species Specialist Group (ISSG)., 2010. A Compilation of Information Sources for Conservation Managers.
Summary: This compilation of information sources can be sorted on keywords for example: Baits & Lures, Non Target Species, Eradication, Monitoring, Risk Assessment, Weeds, Herbicides etc. This compilation is at present in Excel format, this will be web-enabled as a searchable database shortly. This version of the database has been developed by the IUCN SSC ISSG as part of an Overseas Territories Environmental Programme funded project XOT603 in partnership with the Cayman Islands Government - Department of Environment. The compilation is a work under progress, the ISSG will manage, maintain and enhance the database with current and newly published information, reports, journal articles etc.
Lewis, L.V. 1912. A few notes on *Solenopsis geminata*. Proceedings of the Hawaiian Entomological Society, 2: 175&#65533;178.
McGlynn, T.P. 1999. The Worldwide Transfer of Ants: Geographical Distribution and Ecological Invasions, *Journal of Biogeography 26*(3): 535-548.
Nafus, D.M. 1993. Movement of introduced biological control agents onto nontarget butterflies, *Hypolimnas* spp. (Lepidoptera: Nymphalidae). Environmental Entomology, 22 (2): 265&#65533;272.
Summary: Impact of ant invasions on butterfly sp in Guam.
Ness, J.H and Bronstein, J.L. 2004. The Effects of Invasive Ants on Prospective ant Mutualists, *Biological Invasions 6*: 445-461.
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.

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 &#65533; 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.
Available from: http://www.lucidcentral.org/keys/v3/PIAkey/index.html [Accessed 17 December 2008]
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Summary: An account of ant invasion in the Tiwi Islands, Northern Territory.
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Summary: This database compiles information on alien species from British Overseas Territories.
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Summary: Cette &#65533;tude porte sur les relations comp&#65533;titives entre trois esp&#65533;ces ainsi que sur les facteurs li&#65533;s &#65533; leur succ&#65533;s dans l invasion des milieux.
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ITIS (Integrated Taxonomic Information System), 2005. Online Database *Solenopsis geminata*
Summary: An online database that provides taxonomic information, common names, synonyms and geographical jurisdiction of a species. In addition links are provided to retrieve biological records and collection information from the Global Biodiversity Information Facility (GBIF) Data Portal and bioscience articles from BioOne journals.
Available from:
http://www.cbif.gc.ca/pls/itisca/taxastep?king=every&p_action=containing&taxa=Solenopsis+geminata&p_format=&p_ifx=plglt&p_lang= [Accessed March 2005]
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