

## ACKNOWLEDGMENTS

Primary funding for the study was from the U.S. Fish and Wildlife Service. Funding was also received from the US Geological Survey, Invasive Species Program. Paul Krushelnycky, Will Haines, Neil Reimer, Pat Conant, and Mach Fukada helped with study design and ant identifications. Two anonymous reviewers provided valuable suggestions for a draft version of the text.

## LITERATURE CITED

Abedrabbo, S. 1994. Control of the little fire ant, *Wasmannia auropunctata*, on Santa Fe Island in the Galápagos Islands. Pages 219-227 in D.F. Williams (ed.), *Exotic ants: biology, impact, and control of introduced species*. Westview Press, Boulder, CO.

AntWeb. 2007. The California Academy of Sciences. <<http://www.antweb.org>> (Accessed: Mar. 23, 2007).

Beardsley, J.W. 1980. Notes and exhibitions. *Proceedings, Hawaiian Entomological Society* 23: 186.

Bishop Museum. 2006. Bishop Museum Taxonomy Database. Bishop Museum, Honolulu, HI and Pacific Basin Information Node website. <<http://www2.bishopmuseum.org/natscidb/>> (Accessed: Mar. 29, 2007).

Brandao, C.R.F. and R.V.S. Paiva. 1994. The Galápagos ant fauna and the attributes of colonizing ant species. Pages 1-10 in D.F. Williams (ed.), *Exotic ants, biology, impact, and control of introduced species*. Westview Press, Boulder, CO.

Brown, W. L., Jr. 1958. A review of the ants of New Zealand. *Acta Hymenopterologica* 1: 1-50.

Bueno, O.C., and H.G. Fowler 1994. Exotic ants and native ant fauna of Brazilian hospitals. Pages 191-198 in D.F. Williams (ed.), *Exotic ants. biology, impact, and control of introduced species*. Westview Press, Boulder, CO.

Carter, W. 1967. *Insects and related pests of pineapple in Hawaii*. Pineapple Research Institute of Hawaii, Honolulu, HI.

Clark, D.B., C. Guayasamin, O. Pazamino, C. Donoso and Y. Paez de Villacis. 1982. The tramp ant *Wasmannia auropunctata*: autecology and effects on ant diversity and distribution on Santa Cruz Island, Galápagos. *Biotropica* 14: 196-207.

- Cole, F.R., A.C. Medeiros, L.L.Loope, and W.W. Zuehlke. 1992. Effects of the Argentine ant (*Iridomyrmex humilis*) on the arthropod fauna of high-elevation shrubland, Haleakala National Park, Maui, Hawaii. *Ecology* 7(4): 1313-1322.
- Conant, P., and C. Hirayama. 2000. *Wasmannia auropunctata* (Hymenoptera: Formicidae) established on the island of Hawaii. *Bishop Museum Occasional Papers* 64: 21-22.
- Conant, P., R.A. Heu, L. Nakahara, B. Kumashiro, and N. Reimer. 2007. Little Fire Ant *Wasmannia auropunctata* (Roger) (Hymenoptera: Formicidae). State of Hawaii Department of Agriculture, New Pest Advisory No. 99-02, updated Feb. 2007.
- Conant, P., and E. VanGelder. 2003. Survey protocol for detecting new infestations of little fire ant (LFA) *Wasmannia auropunctata*. Unpublished. Hawaii Department of Agriculture and Hawaii Ant Group.
- CTAHR (College of Tropical Agriculture and Human Resources). 2006. Stop the. Little Fire Ant. A tiny new stinging ant is spreading across Hawai'i. <[www.ctahr.hawaii.edu/oc/freepubs/pdf/IP-LFA.pdf](http://www.ctahr.hawaii.edu/oc/freepubs/pdf/IP-LFA.pdf)> (Accessed: Mar. 25, 2007).
- CTAHR (College of Tropical Agriculture and Human Resources). 2007. Ants of Hawaii: Photos and identification resources. University of Hawaii, Manoa. <<http://www.ctahr.hawaii.edu/peps/museum/ant.htm>> (Accessed: Mar. 23, 2007).
- Delabie, J.H.C., I.C. do Nascimento, P. Pacheco and A.B. Casimero. 1995. Community structure of house-infesting ants (Hymenoptera: Formicidae) in southern Bahia, Brazil. *Florida Entomologist* 78: 264-270.
- Deyrup, M., L. Davis, and S. Cover. 2000: Exotic ants in Florida. *Transactions of the American Entomological Society* 126: 293–326.
- Feitosa, R.M. 2007. Aggregation and adult transportation in disturbed colonies of *Wasmannia auropunctata* Roger (Hymenoptera, Formicidae). *Insectes Sociaux* 54: 200-201.
- Forel, A. 1899. Heterogyna (Formicidae), Vol. 1. pages 116-122, in D. Sharp (ed.), *Fauna Hawaiiensis*. Cambridge, England: Cambridge-at-the-University Press.
- GISD (Global Invasive Species Database). 2006. *Tapinoma melanocephala*. Invasive Species Specialist Group of the IUCN Species Survival Commission, Global Invasive Species Programme. <<http://www.issg.org/database/species/ecology.asp?si=959&fr=1&sts=>> (Accessed: Mar. 27, 2007).
- Gulick, L. 1913. Synoptic list of ants reported from the Hawaiian Islands. *Proceedings, Hawaiian Entomological Society* 2: 306-311.

Hahn, J. 2007. Ants from out of this world. *Yard and Garden News*. University of Minnesota Extension Service.  
<http://www.extension.umn.edu/projects/yardandgarden/YGLNews/YGLNewsJan12007.html>> Accessed: Mar. 29, 2007).

Hawaii Department of Agriculture. 2007. Little fire ant strategic plan. Draft version, July 2007.

HEAR (Hawaiian Ecosystems at Risk). 2003. Hoike o Haleakala: Maui Environmental Education Curriculum. <<http://www.hear.org/hoike>> (Accessed: Mar. 23, 2007).

Hoffman, B. 2006. *Pheidole megacephala*. Global Invasive Species Database. Invasive Species Specialist Group of the IUCN Species Survival Commission, Global Invasive Species Programme.  
<<http://www.issg.org/database/species/ecology.asp?si=132&fr=1&sts=>> (Accessed: Mar. 27, 2007).

Holway, D.A., L. Lach, A.V. Suarez, N.D. Tsutsui, and T.J. Case. 2002. The causes and consequences of ant invasions. *Annual Review of Ecology and Systematics* 33: 181-233.

Huddleston, E.W., and S. Fluker. 1968. Distribution of ant species of Hawaii. *Proceedings, Hawaiian Entomological Society* 20: 45-69.

Krushelnycky, P.D. 2006. *Linepithema humile*. Global Invasive Species Database. Invasive Species Specialist Group of the IUCN Species Survival Commission, Global Invasive Species Programme.  
<<http://www.issg.org/database/species/ecology.asp?si=127&fr=1&sts=>> (Accessed: Mar. 23, 2007).

Krushelnycky, P.D., S.M. Joe, A.C. Medeiros, C.C. Daehler, and L.L. Loope. 2005a. The role of abiotic conditions in shaping the long-term patterns of a high-elevation Argentine ant invasion. *Diversity and Distributions* 11:319-331.

Krushelnycky, P.D., L.L. Loope, and N.J. Reimer. 2005b. The ecology, policy, and management of ants in Hawaii. *Proceedings, Hawaiian Entomological Society* 37: 1-25.

Le Breton, J., H. Jourdan, J. Chazeau, J. Orivel, and A. Dejean. 2005. Niche opportunity and ant invasion: the case of *Wasmannia auropunctata* in a New Caledonian rain forest. *Journal of Tropical Ecology* 21: 93-98.  
<<http://journals.cambridge.org/action/displayAbstract?fromPage=online&aid=274204>> (Accessed: Mar. 25, 2007).

Lofgren, C.S. 1986. The economic importance and control of imported fire ants in the United States. Pages 227-256 in S.B. Vinson (ed.) *Economic impact and control of social insects*. Praeger, NY.

- Longino, J.T. 2003a. *Monomorium floricola*. Discover Life. The Evergreen State College, Olympia WA. <<http://stri.discoverlife.org/mp/20q?search=Monomorium+floricola>> (Accessed: Mar. 28, 2007).
- Longino, J.T. 2003b. *Tetramorium bicarinatum*. Ants of Costa Rica. The Evergreen State College, Olympia WA. <<http://academic.evergreen.edu/projects/ants/Genera/tetramorium/species/bicarinatum/bicarinatum.html>> (Accessed: Mar. 28, 2007).
- Longino, J.T. 2003c. *Tetramorium simillimum*. Ants of Costa Rica. The Evergreen State College, Olympia WA. <<http://academic.evergreen.edu/projects/ants/genera/tetramorium/species/simillimum/simillimum.html>> (Accessed: Mar. 28, 2007).
- Longino, J.T. 2004. *Brachymyrmex obscurior*. Ants of Costa Rica. The Evergreen State College, Olympia WA. <<http://academic.evergreen.edu/projects/ants/genera/brachymyrmex/species/obscurior/obscurior.html>> (Accessed: Mar. 29, 2007).
- Lubin, Y.D. 1984. Changes in the native fauna of the Galápagos Islands following invasion by the little red fire ant, *Wasmannia auropunctata*. *Biological Journal of the Linnean Society* 21: 229-242.
- McGlynn, T.P. 1999. The worldwide transfer of ants: geographic distribution and ecological invasions. *Journal of Biogeography* 26: 535-548.
- Nickerson, J.C., Harris, D.L., and T.R. Fasulo. 2003. Pharaoh ant: *Monomorium pharaonis*. Featured Creatures. Publication Number: EENY-290. Originally published as DPI Entomology Circular 256. Florida Department of Agriculture and Consumer Services, Division of Plant Industry. <[http://creatures.ifas.ufl.edu/urban/ants/pharaoh\\_ant.htm](http://creatures.ifas.ufl.edu/urban/ants/pharaoh_ant.htm)> (Accessed: Mar. 23, 2007).
- Nishida, G.M. 2002. Hawaiian Terrestrial Arthropod Checklist. 4<sup>th</sup> ed. *Bishop Museum Technical Report No. 22*. Hawaii Biological Survey, Bishop Museum, Honolulu, HI.
- Null, W., and K. Gunderson. 2006. Little fire ant (*Wasmannia auropunctata*) -- Its presence on Kauai. An island-wide survey funded by US Fish & Wildlife (USFWS), Pacific Cooperative Studies Unit (PCSU), University of Hawaii Manoa.
- Oboyski, P.T., and P.C. Banko. 2004. Mauna Kea ant survey. Hawaii Ant Group Webpage. <<http://www.hawaiiantgroup.org/MaunaKeaAnts.html>> (Accessed: Mar. 28, 2007).

O'Dowd, D. 2006. *Anoplolepis gracilipes*. Global Invasive Species Database. Invasive Species Specialist Group of the IUCN Species Survival Commission, Global Invasive Species Programme.

<<http://www.issg.org/database/species/ecology.asp?si=110&fr=1&sts=>> (Accessed: Mar. 27, 2007).

Passera, L. 1994. Characteristics of tramp species. Pages 23-43 in D.F. Williams (ed.) *Exotic ants, biology, impact, and control of introduced species*. Westview Press, Boulder, CO.

Reimer, N.J., J.W. Beardsley, and G. Jahn. 1990. Pest ants in the Hawaiian Islands. Pages 40-50 in R.K. Vander Meer, K. Jaffe, and A. Cedeno (eds.), *Applied myrmecology: a world perspective*. Westview Press, Boulder, CO.

Reimer, N.J. 1994. Distribution and impact of alien ants in vulnerable Hawaiian ecosystems. Pages 11-22 in D.F. Williams (ed.), *Exotic ants: biology, impact, and control of introduced species*. Westview Press, Boulder, CO.

Roque-Albelo, L., and C.E. Causton. 1999. El Niño and introduced insects in the Galápagos Islands: different dispersal strategies, similar effects. *Noticias de Galápagos* 60: 30-36.

Seifert, B. 2003. The ant genus *Cardiocondyla* (Insecta: Hymenoptera: Formicidae): A taxonomic revision of the *C. elegans*, *C. bulgarica*, *C. batesii*, *C. nuda*, *C. shuckardi*, *C. stambuloffii*, *C. wroughtonii*, *C. emeryi*, and *C. minutior* species groups. *Annalen des Naturhistorischen Museum in Wien Serie B Botanik und Zoologie* 104B: 203-338.

Shattuck, S. O. 1992. Generic revision of the ant subfamily Dolichoderinae (Hymenoptera: Formicidae). *Sociobiology* 21: 1-181.

Silberglied, R. 1972. The 'little fire ant,' *Wasmannia auropunctata*, a serious pest in the Galapagos Islands. *Noticias de Galápagos* 19/20: 13-15.

Smith, F. 1879. Descriptions of new species of aculeate Hymenoptera collected by the Rev. Thos. Blackburn in the Sandwich Islands. *Proceedings, Linnean Society of London* 14: 674-685.

Smith, D. R. 1979. Superfamily Formicoidea. Pages 1323-1467 in K.V. Krombein, P.D. Hurd, D.R. Smith, and B.D. Burks. *Catalog of Hymenoptera in America north of Mexico*. Washington, D.C. Smithsonian Institution Press, Washington, D.C. 2735 pp.

Starr, F., K. Starr, and L. Loope. 2004. New arthropod records from Kahoolawe. *Bishop Museum Occasional Papers* 79(2): 50-54.

Swezey, O.H. 1914. A note on *Technomyrmex albipes*. *Proceedings, Hawaiian Entomological Society* 3: 56.

- Swezey, O.H. 1944. Notes and exhibitions. *Proceedings, Hawaiian Entomological Society* 12: 25.
- Swezey, O.H. 1945. Insects associated with orchids. *Proceedings, Hawaiian Entomological Society* 12: 343-403.
- Timberlake, P.H. 1925. Notes and exhibitions. *Proceedings, Hawaiian Entomological Society*. 6: 12-13.
- Trager, J.C. 1984. A revision of the genus *Paratrechina* (Hymenoptera: Formicidae) of the continental United States. *Sociobiology* 9: 51–162.
- Tsutsui, N.D., A.V. Suarez, D.A. Holway, and T.J. Case. 2001. Relationships among native and introduced populations of the Argentine ant, *Linepithema humile* and the source of introduced populations. *Molecular Ecology* 10: 2151-2161.
- Tsutsui, N.D., and A.V. Suarez. 2003. The colony structure and population biology of invasive ants. *Conservation Biology* 17(1): 48-58.
- Vonshak, M., T. Dayan, and A. Hefetz. 2006. Unicoloniality in the little fire ant *Wasmannia auropunctata* in Israel. Abstract. International Union for the Study of Social Insects Congress, 2006, Washington, D.C.  
<<http://iussi.confex.com/iussi/2006/techprogram/P2275.HTM>> (Accessed: Mar. 25, 2007).
- Walker, K. 2006. Impact of the little fire ant, *Wasmannia auropunctata*, on native forest ants in Gabon. *Biotropica* 38: 666-673.
- Walsh, P.D., P. Henschel, K.A. Abernethy, C.E.G. Tutin, P. Telfer, and S.A. Lahm. 2004. Logging speeds little red fire ant invasion of Africa. *Biotropica* 36: 637-641.
- Warner, J., R.H. Scheffrahn, and B. Cabrera. 2004. White footed ant, *Technomyrmex albipes*. Featured Creatures. Publication Number: EENY-273. Florida Department of Agriculture and Consumer Services, Division of Plant Industry.  
<[http://creatures.ifas.ufl.edu/urban/ants/white-footed\\_ant.htm](http://creatures.ifas.ufl.edu/urban/ants/white-footed_ant.htm)> (Accessed: Mar. 23, 2007).
- Wetterer, J.K. 1997. Alien ants of the Pacific islands. *Aliens* 6: 3-4.
- Wetterer, J.K. 2002. Ants of Tonga. *Pacific Science* 56(11): 125.
- Wetterer, J.K. 2005. Worldwide distribution and potential spread of the long-legged ant, *Anoplolepis gracilipes* (Hymenoptera: Formicidae). *Sociobiology* 45: 77–97.

Wetterer, J.K. 2006. *Wasmannia auropunctata*. Global Invasive Species Database. Invasive Species Specialist Group of the IUCN Species Survival Commission, Global Invasive Species Programme.  
<<http://www.issg.org/database/species/ecology.asp?si=58&fr=1&sts=>> (Accessed: Mar. 23, 2007).

Wetterer, J.K., and S.D. Porter. 2003. The little fire ant, *Wasmannia auropunctata*: distribution, impact, and control. *Sociobiology* 42: 1-41.

Wetterer, J.K., P.D. Walsh, and L.J.T. White. 1999. *Wasmannia auropunctata* (Roger) (Hymenoptera: Formicidae), a highly destructive tramp ant, in wildlife refuges of Gabon, West Africa. *African Entomologist* 7: 292-294.

Wheeler, W.M. 1934. Revised list of Hawaiian ants. *Bishop Museum Occasional Papers* 10: 1-21.

Wilson, E.O., and R.W. Taylor. 1967. The ants of Polynesia (Hymenoptera: Formicidae). *Pacific Insects Monograph* 14: 1-109.

Yates, J.R. 2006. *Solenopsis geminata*. Global Invasive Species Database. Invasive Species Specialist Group of the IUCN Species Survival Commission, Global Invasive Species Programme.  
<<http://www.issg.org/database/species/ecology.asp?si=169&fr=1&sts=>> (Accessed: Mar. 26, 2007).

Zimmerman, E.C. 1953. Notes and exhibitions. *Proceedings, Hawaiian Entomological Society* 15: 10.