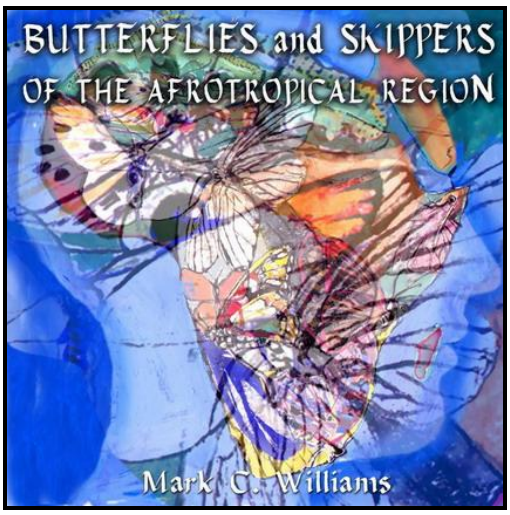
AFROTROPICAL BUTTERFLIES



BIBLIOGRAPHY OF MYRMECOPHILY IN LYCAENIDAE AND RIODINIDAE

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*** Indicates that a PDF is in my possession.**

AGRAWAL, A.A., & FORDYCE, J.A. 2000. Induced indirect defence in a lycaenid-ant association: the regulation of a resource in a mutualism. *Proceedings of the Royal Society of London Series B Biological Sciences* **267** (1455): 1857-1861. [*Plebejus acmon*; *Lipepithema humile*]

***AKINO, T., KNAPP, J.J., THOMAS, J.A., & ELMES, G.W. 1999.** Chemical mimicry and host specificity in the butterfly *Maculinea rebeli*, a social parasite of *Myrmica* ant colonies. *Proceedings of the Royal Society of London B* **266**: 1419-1426. [GOT]

ALS, T.D., NASH, D.R., & BOOMSMA, J.J. 2001. Adoption of parasitic *Maculinea alcon* caterpillars (Lepidoptera: Lycaenidae) by three *Myrmica* ant species. *Animal Behaviour* **62** (1): 99-106.

ALS, T.D., NASH, D.R., & BOOMSMA, J.J. 2002. Geographical variation in host-ant specificity of the parasitic butterfly *Maculinea alcon* in Denmark. *Ecological Entomology* **27** (4): 403-414.

ALS, T.D., VILA, R., KANDUL, N.P., NASH, D.R., YEN, S.H., HSU, Y.F., MIGNAULT, A.A., BOOMSMA, J.J., & PIERCE, N.E. 2004. The evolution of alternative parasitic life histories in large blue butterflies. *Nature (London)* **432** (7015): 386-390.

ANON, 1978. Rabbits and the large blue butterfly. *Sanctuary (Chessington)* No. 3: 19-20. [*Maculinea arion*; *Myrmica sabuleti*; England]

ANTON, C., MUSCHE, M., & SETTELE, J. 2007. Spatial patterns of host exploitation in a larval parasitoid of the predatory dusky large blue *Maculinea nausithous*. *Basic and Applied Ecology* **8** (1): 66-74.

ANTON, C., MUSCHE, M., HULA, V. & SETTELE, J. 2008. Myrmica host-ants limit the density of the ant-predatory large blue *Maculinea nausithous*. *Journal of Insect Conservation* **12** (5): 511-517.

ANTON, C., ZEISSET, I., MUSCHE, M., DURKA, W., BOOMSMA, J.J. & SETTELE, J. 2007. Population structure of a large blue butterfly and its specialist parasitoid in a fragmented landscape. *Molecular Ecology* **16** (18): 3828-3838.

APPELQVIST, T., GIMDAL, R., FINSBERG, M., & BENGTSON, O. 1999. Alkonblavingen (*Maculinea alcon*) i Vastra Gotalands Ian – habitatval och naturvardsaspekter. *Entomologisk Tidskrift* **119** (3-4): 121-130. [*Myrmica*]

ARNALDO, P.S., WYNHOFF, I., SOARES, P., DA CONCEICAO RODRIGUES, M., ARANHA, J., CSOSZ, S.. MARAVALHAS, E. & TARTALLY, A. 2011. *Maculinea alcon* exploits *Myrmica aloba* in Portugal: unusual host ant species of a myrmecophilous butterfly in a peripheral region. *Journal of Insect Conservation* **15** (3): 465-467.

Abstract: Larvae of the obligate myrmecophilous social parasite *Maculinea alcon* (Lepidoptera: Lycaenidae) were found exclusively using *Myrmica aloba* (Hymenoptera: Formicidae) ant hosts in NE-Portugal. This is the first record of the host ant usage of any *Maculinea* species in Portugal, and of any *Maculinea* using *M. aloba* nests. These results on such peripheral European populations confirm that knowledge of the local host ant species is crucial for the successful protection of these endangered butterflies, and vital for examining the evolution of such interactions.

ASTON, C.E., & DUNN, K.L. 1985. Ants attendant on *Ogyris amaryllis amata* Waterhouse (Lepidoptera: Lycaenidae). *Australian Entomological Magazine* **12** (2): 36. [*Camponotus*; *Crematogaster*; *Iridomyrmex*; Australia]

ATKINS, A. 1992. On the taxonomic changes to lycaenid-associated ants of the genus *Iridomyrmex*. *Victorian Entomologist* **22** (3): 72-73. [Australia]

***ATSATT, P.R. 1981a.** Lycaenid butterflies and ants: selection for enemy-free space. *American Naturalist* **118** (5): 638-654. [General reference]

ATSATT, P.R. 1981b. Ant-dependent food plant selection by the mistletoe butterfly *Ogyris amaryllis* (Lycaenidae). *Oecologia (Berlin)* **48** (1): 60-63.

AXEN, A.H. 2001. Variation in behavior of lycaenid larvae when attended by different ant species. *Evolutionary Ecology* **14** (7): 611-625. [*Glaucopsyche lygdamus*]

AXEN, A.H., LEIMAR, O., & HOFFMAN, V. 1996. Signalling in a mutualistic interaction. *Animal Behaviour* **52** (2): 321-333. [*Polyommatus icarus*; *Lasius*]

AXEN, A.H., & PIERCE, N.E. 1998. Aggregation as a cost-reducing strategy for lycaenid larvae. *Behavioral Ecology* **9** (2): 109-115. [*Jalmenus evagoras*; *Iridomyrmex*]

BACHTOLD, A., ALVES-SILVA, E., KAMINSKI, L.A. & DEL-CLARO, K. 2014. The role of tending ants in host plant selection and egg parasitism of two facultative myrmecophilous butterflies. *Naturwissenschaften* **101** (11): 913-919.

BAECHTOLD, A. & ALVES-SILVA, E. 2013. Behavioral strategy of a lycaenid (Lepidoptera) caterpillar against aggressive ants in a Brazilian savanna. *Acta Ethologica* **16**(2): 83-90.

Abstract: Myrmecophily is widespread in lycaenid butterflies, in which ants receive food resources and, in turn, protect caterpillars against natural enemies. This interaction ranges from obligate myrmecophily, in which immatures are invariably associated with ants and are dependent on ants for survival, and facultative myrmecophily, in which larvae are not dependent on ants for survival, but the presence of the latter may increase larvae survival. Lycaenids also include non-myrmecophilous butterflies, which do not have positive associations with ants and have developed strategies to avoid being attacked or preyed upon by them. In this study, we examined the relationship between the lycaenid *Michaelus ira* and two ant species associated with *Distictella elongata* (Bignoniaceae). This plant has extrafloral nectaries and is patrolled by *Camponotus crassus* and *Ectatomma tuberculatum*. Morphological analyses revealed that *M. ira* larvae have ant organs, such as dorsal nectary organs and perforated cupolas, structures associated with myrmecophily. We performed larval exposure experiments in the field, predicting that, in the absence of myrmecophily, the butterfly larva would present strategies to avoid ant attack. Results showed that larvae were attacked by both ant species. To escape ant molestation, larvae lived and fed inside silk-sealed *D. elongata* flower buds. We concluded that the *M. ira* bud-sheltering behavior was a defensive strategy against these ant species, while the dorsal nectary organs were apparently nonfunctional. Nonetheless, myrmecophily, in general, cannot be excluded in *M. ira* since relationships with other ant species may exist.

BALLMER, G.R. 2003. Observations on resource partitioning among ants (Hymenoptera: Formicidae) and lycaenid larvae (Lepidoptera: Lycaenidae) associated with *Pueraria phaseoloides* in south Thailand. *Science Asia* **29** (3): 197-202.

***BALLMER, G.R., & PRATT, G.F. 1991.** Quantification of ant attendance (myrmecophily) of lycaenid larvae. *Journal of Research on the Lepidoptera* **30** (1-2): 95-112. [*Formica pilicornis*]

BARBERO, F., BONELLI, S., THOMAS, J.A., BALLETTO, E. & SCHOENROGGE, K. 2009. Acoustical mimicry in a predatory social parasite of ants. *Journal of Experimental Biology* **212** (24): 4084-4090. [*Maculinea*; *Myrmica*]

BARBERO, F., PATRICELLI, D., WITEK, M., BALLETTO, E., CASACCI, L.P., SALA, M. & BONELLI, S. 2012. *Myrmica* ants and their butterfly parasites with special focus on the acoustic communication. *Psyche (Cambridge)* 2012: 11pp. Article ID 725237.

Abstract: About 10,000 arthropod species live as ants' social parasites and have evolved a number of mechanisms allowing them to penetrate and survive inside the ant nests. *Myrmica* colonies, in particular, are exploited by numerous social parasites, and the presence of their overwintering brood, as well as of their polygyny, contributes to make them more vulnerable to infestation. Butterflies of the genus *Maculinea* are among the most investigated *Myrmica* inquilines. These lycaenids are known for their very complex biological cycles. *Maculinea* species are obligated parasites that depend on a particular food plant and on a specific *Myrmica* species for their survival. *Maculinea* larvae are adopted by *Myrmica* ants, which are induced to take them into their nests by chemical mimicry. Then the parasite spends the following 11 – 23 months inside the ants' nest. Mimicking the acoustic emission of the queen ants, *Maculinea* parasites not only manage to become integrated, but attain highest rank within the colony. Here we review the biology of *Maculinea*/*Myrmica* system with a special focus on some recent breakthrough concerning their acoustical patterns.

BARBERO, F., THOMAS, J.A., BONELLI, S., BALLETTO, E. & SCHONROGGE, K. 2009. Queen ants make distinctive sounds that are mimicked by a butterfly social parasite. *Science (Washington DC)* **323** (5915): 782-785. [*Myrmica schencki, Maculinea rebeli*]

BASHFORD, R. 1993. A colony of the hairstreak butterfly, *Pseudalmenus chlorinda* s.sp. near *zephyrus*, protected within a forest reserve. *Tasmanian Naturalist* No. 112: 9-11. [*Anonychomyrma bicomvexa*]

BATARY, P., ORVOSSY, N., KOROSI, A., VALYI-NAGY, M. & PEREGOVITS, L. 2007. Microhabitat preferences of *Maculinea teleius* (Lepidoptera: Lycaenidae) in a mosaic landscape. *European Journal of Entomology* **104** (4): 731-736.

BAUMGARTEN, H.T., & FIEDLER, K. 1998. Parasitoids of lycaenid butterfly caterpillars: different patterns in resource use and their impact on the hosts' symbiosis with ants. *Zoologischer Anzeiger* **236** (2-3): 167-180. [*Polyommatus*; *Lasius*]

BAYLIS, M., & PIERCE, N.E. 1991. The effect of host-plant quality on the survival of larvae and oviposition by adults of an ant-tended lycaenid butterfly, *Jalmenus evagoras. Ecological Entomology* **16** (1): 1-9. [*Iridomyrmex anceps*]

BAYLIS, M., & PIERCE, N.E. 1992. Lack of compensation by final instar larvae of the myrmecophilous lycaenid butterfly, *Jalmenus evagoras*, for the loss of nutrients to ants. *Physiological Entomology* **17** (2): 107-114. [*Iridomyrmex anceps*]

BAYLIS, M., & PIERCE, N.E. 1993. The effects of ant mutualism on the foraging and diet of lycaenid caterpillars. *In*: STAMP, N.E., & CASEY, T.M. [Eds]. *Caterpillars: ecological and evolutionary constraints on foraging.* Chapman & Hall. New York & London: i-xiii, 1-587. Chapter pagination: 404-421. [General reference]

***BEALE, J.P. 1998.** Temporal and spatial distribution of the rare, myrmecophagous Illidge's ant-blue butterfly, *Acrodipsas illidgei* (Lycaenidae). *Journal of the Lepidopterists' Society* **52** (2): 139-150. [*Crematogaster*]

BEALE, J.P., & ZALUCKI, M.P. 1995. Status and distribution of *Acrodipsas illidgei* (Waterhouse and Lyell) (Lepidoptera: Lycaenidae) at Redland Bay, southeastern Queensland, and a new plant-association record. *Journal of the Australian Entomological Society* **34** (2): 163-168. [*Crematogaster*]

BEAU, F., THIRION, J.M., & FORTI, M. 2005. Traits de vie d'une population d'Azure du serpolet de la Reserve Naturelle Regionale de Chateau-Gaillard. *Annales de la Societe des Sciences Naturelles de la Charente Maritime* **9** (5): 535-545. [*Maculinea arion*; *Myrmica sabuleti*; habitat management]

BENYAMINI, D. 1995. Synopsis of biological studies of the Chilean Polyommatini (Lepidoptera, Lycaenidae). *Reports of the Museum of Natural History University of Wisconsin Stevens Point* **52**: 1-51.

BENYAMINI, D., & BALINT, Z. 1995. Studies of life history and myrmecophily in certain Chilean *Pseudolucia* Nabokov (Lycaenidae). *Reports of the Museum of Natural History University of Wisconsin Stevens Point* **51**: 1-7. [*Camponotus*; *Dorymyrmex*]

BERECZKI, J., RACZ, R., VARGA, Z. & TOTH, J.P. 2015. Controversial patterns of *Wolbachia* infestation in the social parasitic *Maculinea* butterflies (Lepidoptera: Lycaenidae). *Organisms Diversity & Evolution* **15** (3): 591-607.

BILLICK, I., BROWN, R., & REITHEL, J.S. 2005. Importance of fertilization of host plants to ant tending and growth rates in *Glaucopysche* [*Glaucopsyche*] *lygdamus* (Lepidoptera: Lycaenidae). *Annals of the Entomological Society of America* **98** (4): 491-495. [Colorado]

BLUTHGEN, N., & FIEDLER, K. 2002. Interactions between weaver ants *Oecophylla smaragdina*, homopterans, trees and lianas in an Australian rain forest canopy. *Journal of Animal Ecology* **71** (5): 793-801.

BODI, E. 1984a. Les chenilles des papillons diurnes europeens. Un apercu. Quinzieme serie. *Bulletin de la Societe Sciences Nat.* No. 41: 19-21. [Techniques for rearing ant-associated lycaenids]

BODI, E. 1984b. Les chenilles des papillons diurnes europeens. Un apercu. Seizieme serie. *Bulletin de la Societe Sciences Nat.* No. 41: 21-23. [Techniques for rearing ant-associated lycaenids]

BOULARD, M. 1981. Nouveaux documents sur les chenilles de lycenes tropicaux (Lep. Lycaenidae). *Alexanor* **12** (3): 135-140. [*Camponotus latangulus*; Rearing techniques; Afrotropical?]

BOURN, N.A.D., & THOMAS, J.A. 2002. The challenge of conserving grassland insects at the margins of their range in Europe. *Biological Conservation* **104** (3): 285-292. [*Polyommatus bellargus*]

BOWERS, M.D., & LARIN, Z. 1989. Acquired chemical defense in the lycaenid butterfly, *Eumaeus atala*. *Journal of Chemical Ecology* **15** (4): 1133-1146. [*Camponotis abdominalis*]

***BRABY, M.F. 1990.** The life history and biology of *Paralucia pyrodiscus lucida* Crosby (Lepidoptera: Lycaenidae). *Journal of the Australian Entomological Society* **29**: 41-50.

***BRABY, M.F. & DOUGLAS, F. 2008.** The nomenclature, taxonomy and conservation status of *Ogyris waterhouseri* (Bethune-Baker, 1905) stat. nov. (Lepidoptera: Lycaenidae) a threatened butterfly from southern Australia. *Australian Journal of Entomology* **47**: 315-329.

BRAEU, M., GROS, P., NUNNER, A., STETTMER, C., & SETTELE, J. 2006. Der verlustreiche Weg in die Sicherheit eines Wirtsameisen-Nestes – neue Daten zur Entwicklungsbiologie und zur Mortalitaet der Praeimaginalstadien von *Maculinea alcon* sowie zum Einfluss der Mahd. *Abhandlungen aus dem Westfaelischen Museum fuer Naturkunde* **68** (3-4): 197-219.

BRAKEFIELD, P.M., SHREEVE, T.G., & THOMAS, J.A. 1992. Avoidance, concealment, and defence. *In*: DENNIS, R.L.H. [Ed.]. *The ecology of butterflies in Britain*. Oxford University Press. Oxford & New York: i-xi, 1-354. Chapter pagination: 93-119.

BREVIGNON, C. 1992. Elevage de deux Riodininae guyanais, *Napaea beltiana* Bates et *Cremna thasus* Stoll 1. Apropos de lo myrmecophilie des chenilles (Lep. Lycaenidae Riodininae). *Alexanor* **17** (7): 403-413.

BRISTOW, C.M. 1987. On butterflies and ants: when to be a friend. *Trends in Ecology and Evolution* **2** (2); 29-30. [Review]

BRITTON, D.R. 1997. Ant trap nests enable detection of a rare and localised butterfly, *Acrodipsas myrmecophila* (Waterhouse and Lyell) (Lepidoptera: Lycaenidae) in the field. *Memoirs of Museum Victoria* **56** (2): 383-388. [*Papyrius nitidus*]

***BROPHY, J.J., NELSON, D. & PAILLE, R.R. 1982.** A vacuum aspiration apparatus for the efficient collection of ants. *Journal of the Australian Entomological Society* **21**: 303-305.

BROWN, J.W. 1990. Urban biology of *Leptotes marina* (Reakirt) (Lycaenidae). *Journal of the Lepidopterists' Society* **44** (3): 200-201. [*Iridomyrmex humilis*; California]

BURGHARDT, F., & FIEDLER, K. 1996. Myrmecophilous behaviours in caterpillars of the butterfly, *Polyommatus icarus* (Rottemburg, 1775): temporal patterns and age dependency (Lepidoptera: Lycaenidae). *Nota Lepidopterologica* **19** (3-4): 212-229. [*Lasius flavus*]

CALLAGHAN, C.J. 1982. Notes on the immature biology of two myrmecophilous Lycaenidae: *Juditha molpe* (Riodinidae) and *Panthiades bitias* (Lycaeninae). *Journal of Research on the Lepidoptera* **20** (1): 36-42. [*Camponotus*; Colombia]

CALLAGHAN, C.J. 1986. Restinga butterflies: biology of *Synargis brennus* (Stichel) (Riodinidae). *Journal of the Lepidopterists' Society* **40** (2): 93-96. [*Azteca*; *Camponotus crassus*]

CALLAGHAN, C.J. 1992. Biology of epiphyll feeding butterflies in a Nigerian cola forest (Lycaenidae: Lipteninae). *Journal of the Lepidopterists' Society* **46** (3): 203-214. [Afrotropical; Formicidae]

CALLAGHAN, C.J. 1993. Notes on the biology of a myrmecophilous African lycaenid, *Aphnaeus adamsi* Stempffer (Lepidoptera, Lycaenidae). *Bulletin de la Societe Entomologique de France* **97** (4): 339-342. [Afrotropical; *Crematogaster*]

CAMPBELL, D.L., & PIERCE, N.E. 2003. Phylogenetic relationships of the Riodinidae: implications for the evolution of ant association. *In*: BOGGS, C.L., WATT, W.B., & EHRLICH, P.R. [Eds]. *Butterflies: ecology and evolution taking flight*. The University of Chicago Press, Chicago and London. i-xvii, 1-739. Chapter pagination: 395-408. [GOT]

CANO, J.M. 1983. Observaciones sobre la conducta alimentaria de *Lampides boeticus* (L.) y *Callophrys rubi* (L.) (Lep., Lycaenidae). *Actas do Congresso Iberico de Entomologia* **1** (2): 471-474. [myrmecophagy/phytophagy evolution]

CASTILLO-GUEVARA, C., & RICO-GRAY, V. 2002. Is cycasin in *Eumaeus minyas* (Lepidoptera: Lycaenidae) a predator deterrent? *Interciencia* **27** (9): 465-470, 501-503.

CLAASSENS, A.J.M. 1991. The mystery of the squeaking pupae of myrmecophilous Lycaenidae. *Metamorphosis* **2** (3): 19-20. [Afrotropical]

CLAASSENS, A.J.M. 1996. Notes on the feeding habits and protective measures of the larvae of *Durbaniopsis saga* van Son (Lepidoptera: Lycaenidae). *Metamorphosis* **7** (3): 127-128. [Afrotropical]

CLAASSENS, A.J.M. 2003. Observations on the occurrence, general appearance, behaviour and feeding habits of two mymecophilous bristletails (Insecta: Thysanura) in nests of ants associated with lycaenid larvae (Lepidoptera: Lycaenidae). *Metamorphosis* **14** (2): 55-61. [Afrotropical]

CLAASSENS, A.J.M., & HEATH, A. 1997. Notes on the myrmecophilous early stages of two species of *Thestor* Hubner (Lepidoptera: Lycaenidae) from South Africa. *Metamorphosis* **8** (2): 56-61. [Afrotropical; *Anoplolepis custodiens*]

CLAASSENS, A.J.M., & HEATH, A. 2003. The life-history of *Thestor basutus basutus* (Wallengren) (Lepidoptera: Lycaenidae: Miletinae) with new information on its association with pugnacious ants (*Anoplolepis* sp.: Formicidae). *Metamorphosis* **14** (2): 48-54. [Afrotropical]

CLARKE, R.T., THOMAS, J.A., ELMES, G.W., WARDLAW, J.C., MUNGUIRA, M/L/. & HOCHBERG, M.E. 1998. Population modelling of the spatial interactions between *Maculinea rebeli*, their initial foodplant *Gentiana cruciata* and *Myrmica* ants within a site. *Journal of Insect Conservation* **2**: 29-37. [GOT]

CLARKE, R.T., THOMAS, J.A., ELMES, & HOCHBERG, M.E. 1997. The effects of spatial patterns in habitat quality on community dynamics within a site. *Proceedings of the Royal Society of London Series B Biological Sciences* **264** (1380): 347-354. [*Maculinea rebeli*; *Myrmica*]

CLEMENTS, J. 1990. Support the new blues. *Country Life (London)* **184** (24): 312. [*Maculinea arion*; *Myrmica*; England]

COLLIER, N. 2007. Identifying potential evolutionary relationships within a facultative lycaenid-ant system: ant association, oviposition, and butterfly-ant conflict. *Insect Science* **14** (5): 401-409.

CONGDON, T.C.E., & BAMPTON, I. 1995. Ants and lycaenid butterflies – some observations. *Lambillionea* **95** (4): 572-574. [Afrotropical]

COSTA, J.T., MCDONALD, J.H., & PIERCE, N.E. 1996. The effect of ant association on the population genetics of the Australian butterfly *Jalmenus evagoras* (Lepidoptera: Lycaenidae). *Biological Journal of the Linnean Society* **58** (3): 287-306. [*Iridomyrmex*]

COTTRELL, C.B. 1984. Aphytophagy in butterflies: its relationship to myrmecophily. *Zoological Journal of the Linnean Society* **80** (1): 1-57. [Review]

COTTRELL, C.B. 1987. The extraordinary *Liphyra* butterfly. *Transvaal Museum Bulletin* No. 22: 5-12. [*Liphyra brassolis*; *Oecophylla smaragdina*; Australia]

DANIELS, J.C., PENCE, J.A., & EMMEL, T.C. 2005. A new hostplant record for *Strymon martialis* (Lycaenidae: Theclinae) in the Florida Keys. *Journal of the Lepidopterists' Society* **59** (3): 174-175.

DE ASSIS, R.A., BONELLI, S., WITEK, M., BARBERO, F., CASACCI, L.P., BALLETTO, E., VENTURINO, E. & FERREIRA, W.C. Jr. 2012. A model for the evolution of parasite-host interactions based on the *Maculinea-Myrmica* system: Numerical simulations and multiple host behavior. *Nonlinear Analysis Real World Applications* **13** (4): 1507-1524.

Abstract: We present a mathematical model of parasite-host interactions inspired by the *Maculinea-Myrmica* system. Numerical simulations of the model were conducted in order to access the possibility of stable multiple host behavior in the model. Results indicate that multiple host behavior can be observed under natural conditions, although a division of the original parasite population into separate subpopulations, each adapted to one distinct host, is expected. Transitions from single to multiple host behavior are expected to occur if the relative host species abundances change or host's tolerance increases. Further model development and analysis are required to extend these results.

DE-BAAR, M. 1979. Some butterflies and other insects on *Buckinghamia celsissima* F. Muell. in Brisbane. *Entomological Society of Queensland News Bulletin* **7** (3): 36-38. [Australia]

DE-BAAR, M. 1994. New records, food plants and life-history notes for lycaenids (Lepidoptera) and formicids (Hymenoptera). *Entomological Society of Queensland News Bulletin* **22** (4): 50-52. [*Catopyrops florinda*; *Polyrhachis ornata*; *Ogyris zosine*; *Polyrhachis sokolova*; Australia]

DEJEAN, A., & BEUGNON, G. 1996. Host-ant trail following by myrmecophilous larvae of Liphyrinae (Lepidoptera, Lycaenidae). *Oecologia (Berlin)* **106** (1): 57-62. [Afrotropical; *Euliphyra leucyana*; *Euliphyra mirifica*; *Oecophylla longinoda*]

DEUTSCHLANDER, M.S., & BREDENKAMP, G.J. 1999. Importance of vegetation analysis in the conservation management of the endangered butterfly *Aloeides dentatis dentatis* (Swierstra) (Lepidoptera, Lycaenidae). *Koedoe* **42** (2): 1-12. [*Lepisiota capensis*] [Afrotropical]

DEVRIES, P.J. 1984. Of crazy-ants and Curetinae: are *Curetis* butterflies tended by ants? *Zoological Journal of the Linnean Society* **80** (1): 59-66. [*Curetis regula*; *Anoplolepis longipes*; Brunei]

DEVRIES, P.J. 1988a. The larval ant-organs of *Thisbe irenea* (Lepidoptera: Riodinidae) and their effects upon attending ants. *Zoological Journal of the Linnean Society* **94** (4): 379-393. [Panama]

DEVRIES, P.J. 1988b. Ecological aspects of ant association and host plant use in a riodinid butterfly. *Dissertation Abstracts International B Sciences and Engineering* **48** (10): 2863. [*Thisbe irenea*; *Ectatomma ruitum*; Panama]

DEVRIES, P.J. 1990. Enhancement of symbioses between butterfly caterpillars and ants by vibrational communication. *Science (Washington D C)* **248** (No. 4959): 1104-1106. [General article]

DEVRIES, P.J. 1991a. Call production by myrmecophilous riodinid and lycaenid butterfly caterpillars (Lepidoptera): morphological, acoustical, functional, and evolutionary patterns. *American Museum Novitates* No. 3025: 1-23. [General article]

DEVRIES, P.J. 1991b. Mutualism between *Thisbe irenea* butterflies and ants, and the role of ant ecology in the evolution of larval-ant associations. *Biological Journal of the Linnean Society* **43** (3): 179-195. [*Ectatomma ruidum*; Panama]

DEVRIES, P.J. 1991c. Evolutionary and ecological patterns in myrmecophilous riodinid butterflies. *In*: HUXLEY, C.R., & CUTLER, D.F. [Eds]. *Ant-plant interactions*. Oxford University Press. Oxford, New York & Tokyo: i-xviii, 1-601. Chapter pagination: 143-171. [Formicidae; Riodinidae]

DEVRIES, P.J. 1992. Singing caterpillars, ants and symbiosis. *Scientific American* **267** (4): 56-62. [*Thisbe irenea*; Formicidae]

DEVRIES, P.J. 1994. Patterns of butterfly diversity and promising topics in natural history and ecology. *In*: McDADE, L.A., BAWA, K.S., HESPENHEIDE, H.A., & HARTSHORN, G.S. [Eds]. *La Selva: ecology and natural history of a neotropical rainforest*. University of Chicago Press. Chicago & London: i-x, 1-486. Chapter pagination: 187-194. [Formicidae; Riodinidae; Costa Rica]

DEVRIES, P.J. & BAKER, I. 1989. Butterfly exploitation of an ant-plant mutualism: adding insult to herbivory. *Journal of the New York Entomological Society* **97** (3): 332-340. [*Thisbe irenea*; *Ectatomma ruidum*; Panama]

DEVRIES, P.J., CABRAL, B.C., & PENZ, C.M. 2004. The early stages of *Apodemia paucipuncta* (Riodinidae): mymecophily, a new caterpillar ant-organ and consequences for classification. *Milwaukee Public Museum Contributions in Biology and Geology* **102**: 1-13.

DEVRIES, P.J., CHACON, I.A., & MURRAY, D. 1994. Toward a better understanding of host use and biodiversity in riodinid butterflies (Lepidoptera). *Journal of Research on the Lepidoptera* **31** (1-2): 103-126. [Formicidae; Riodinidae]

DEVRIES, P.J., COCROFT, R.B., & THOMAS, J. 1993. Comparison of acoustical signals in *Maculinea* butterfly caterpillars and their obligate host *Myrmica* ants. *Biological Journal of the Linnean Society* **49** (3): 229-238.

DEVRIES, P.J., HARVEY, D.J., & KITCHING, I.J. 1986. The ant associated epidermal organs on the larva of the lycaenid butterfly *Curetis regula* Evans. *Journal of Natural History* **20** (3): 621-633. [*Anoplolepis longipes*]

DEVRIES, P.J., & PENZ, C.M. 2000. Entomophagy, behavior, and elongated thoracic legs in the myrmecophilous neotropical butterfly *Alesa amesis* (Riodinidae). *Biotropica* **32** (4a): 712-721.

DEVRIES, P.J., & POINAR, G.O. 1997. Ancient butterfly-ant symbiosis: direct evidence from Dominican amber. *Proceedings of the Royal Society of London Series B Biological Sciences* **264** (1385): 1137-1140. [*Theope*; Dolichoderinae]

DOWNEY, J.C., & ALLYN, A.C. 1979. Morphology and biology of the immature stages of *Leptotes cassius theonus* (Lucas) (Lepid.: Lycaenidae). *Bulletin of the Allyn Museum* No. 55: 1-27. [Florida, USA]

DUARTE, M., DE ALMEIDA, G.L., MARTINS-CASAGRANDE, M., & MIELKE, O.H.H. 2001. Notes on the last instar larva and pupa of *Hemiargus hanno* (Stoll) (Lepidoptera, Lycaenidae, Polyommatinae). *Revista Brasileira de Zoologia* **18** (4): 1097-1105.

DUARTE, M., ROBBINS, R.K., & MIELKE, O.H.H. 2005. Immature stages of *Calycopis caulonia* (Hewitson, 1877) (Lepidoptera, Lycaenidae, Theclinae, Eumaeini), with notes on rearing detritivorous hairstreaks on artificial diet. *Zootaxa* **1063**: 1-31.

DUNN, K.L. 1995. Biological notes on some eastern Australian butterflies. *Victorian Entomologist* **25** (5): 85-92. [*Ogyris*; *Camponotus*]

DUTRA, H.P., FREITAS, A.V.L., & OLIVEIRA, P.S. 2006. Dual ant attraction in the Neotropical shrub *Urera baccifera* (Urticaceae): the role of ant visitation to pearl bodies and fruits in herbivore deterrence and leaf longevity. *Functional Ecology* **20** (2): 252-260.

EASTWOOD, R. 1997. Field observations on the symbiotic interactions of *Ogyris genoveva* (Hewitson) and *Ogyris zosine* (Hewitson) (Lepidoptera: Lycaenidae) with *Camponotus* spp. (Hymenoptera: Formicidae). *Australian Entomologist* **24** (3): 137-143.

EASTWOOD, R., BRABY, M.F., LOHMAN, D.J. & KING, A. 2008. New ant-lycaenid associations and biological data for some Australian butterflies (Lepidoptera: Lycaenidae). *Australian Entomologist* **35** (1): 47-56.

EASTWOOD, R., & FRASER, A.M. 1999. Associations between lycaenid butterflies and ants in Australia. *Australian Journal of Ecology* **24** (5): 503-537.

EASTWOOD, R., & HUGHES, J.M. 2003. Molecular phylogeny and evolutionary biology of *Acrodipsas* (Lepidoptera: Lycaenidae). *Molecular Phylogenetics and Evolution* **27** (1): 93-102.

EASTWOOD, R., & KING, A.J. 1988. Observations on the biology of *Arhopala wildei* Miskin (Lepidoptera: Lycaenidae) and its host ant *Polyrhacis queenslandica* Emery (Hymenoptera: Formicidae). *Australian Entomologist* **25** (1): 1-6.

EASTWOOD, R., KITCHING, R.L., & MANH, H.B. 2005. Behavioural observations on the early stages of *Jamides celeno* (Cramer) (Lycaenidae) at Cat Tien National Park, Vietnam: an obligate myrmecophile? *Journal of the Lepidopterists' Society* **59** (4): 219-222.

EASTWOOD, R., PIERCE, N.E., KITCHING, R.L., & HUGHES, J.M. 2006. Do ants enhance diversification in lycaenid butterflies? Phylogenetic evidence from a model myrmecophile, *Jalmenus evagoras*. *Evolution* **60** (2): 315-327.

EBERLIE, W.J.D. 1995. Rearing notes from Northumberland County. *Toronto Entomologist Association Occasional Publication* **27**: 7-8. [*Glaucopsyche lygdamus*; *Tapinoma*]

EDGE, D.A., & PRINGLE, E.L. 1996. Notes on the natural history of the Brenton blue, *Orachrysops niobe* (Trimen) (Lepidoptera: Lycaenidae). *Metamorphosis* **7** (3): 109-120. [Afrotropical]

EDGE, D.A., ROBERTSON, H.G. & VAN HAMBURG, H. 2008. Ant assemblages at three potential breeding sites for the Brenton blue butterfly, *Orachrysops niobe* (Trimen). *African Entomology* **16** (2): 253-262.

EDMONDS, W.M.M. 1985. *Satyrium edwardsii*: some notes on life history and interspecific pairing. *News of the Lepidopterists' Society* 1985 (3): 43. [*Lasius alienus*; Ontario]

ELFFERICH, N.W. 1988. Zuchterfahrungen mit *Maculinea alcon* (Denis & Schiffermuller, 1775) (Lepidoptera, Lycaenidae). *Mitteilungen der Entomologischen Gesellschaft Basel* **38** (4): 134-150. [*Myrmica rugodinis*; Europe]

ELFFERICH, N.W. 1989. Einige Bemerkungen zur Biologie von *Plebejus argus* (Linnaeus, 1761) (Lepidoptera, Lycaenidae). *Mitteilungen der Entomologischen Gesellschaft Basel* **39** (1-2): 2-13. [Formicidae; Europe]

ELFFERICH, N.W. 1994. Het boomblauwtje. *Natura (Hoogwoud)* **91** (2): 39-40. [*Celastrina argiolus*; *Lasius*]

ELFFERICH, N.W. 1997. Leven in een mierennest. *Vlinders* **12** (4): 12-15. [*Maculinea nausithous*]

ELFFERICH, N.W. 1998a. Is the larval and imaginal signalling of Lycaenidae and other Lepidoptera related to communication with ants? *Deinsea* **4**: 91-95.

ELFFERICH, N.W. 1998b. New facts on the life history of the dusky large blue *Maculinea nausithous* (Lepidoptera: Lycaenidae) obtained by breeding with *Myrmica* ants in plaster nests. *Deinsea* **4**: 97-102.

ELFFERICH, N.[W.] 2007. Intieme communicatie. *Vlinders* **22** (1): 6-8.

ELMES, G.W., AKINO, T., THOMAS, J.A., CLARKE, R.T., & KNAPP, J.J. 2002. Interspecific differences in cuticular hydrocarbon profiles of *Myrmica* ants are sufficiently consistent to explain host specificity by *Maculinea* (large blue) butterflies. *Oecologia (Berlin)* **130** (4): 525-535.

ELMES, G.W., CLARKE, R.T., THOMAS, J.A., & HOCHBERG, M.E. 1996. Empirical tests of specific predictions made from a spatial model of the population dynamics of *Maculinea rebeli*, a parasitic butterfly of red ant colonies. *Acta Oecologica* **17** (1): 61-80. [*Myrmica*]

ELMES, G.W., & THOMAS, J.A. 1992. Complexity of species conservation in managed habitats: interaction between *Maculinea* butterflies and their ant hosts. *Biodiversity and Conservation* **1** (3): 155-169. [*Myrmica*]

ELMES, G.W., THOMAS, J.A., HAMMARSTEDT, O., MUNGUIRA, M.L., MARTIN, J., & VAN DER MADE, J.G. 1994. Differences in host-ant specificity between Spanish, Dutch and Swedish populations of the endangered butterfly *Maculinea alcon* (Denis et Schiff.) (Lepidoptera). *Memorabilia Zoologica* **48**: 55-68. [*Myrmica*]

ELMES, G.W., THOMAS, J.A., MUNGUIRA, M.L., & FIEDLER, K. 2001. Larvae of lycaenid butterflies that parasitize ant colonies provide exceptions to normal insect growth rules. *Biological Journal of the Linnean Society* **73** (3): 259-278. [*Maculinea*]

ELMES, G.W., THOMAS, J.A., & WARDLAW, J.C. 1991. Larvae of *Maculinea rebeli*, a large-blue butterfly, and their *Myrmica* host ants: wild adoption and behaviour in ant-nests. *Journal of Zoology (London)* **223** (3): 447-460.

ELMES, G.W., THOMAS, J.A., WARDLAW, J.C., HOCHBERG, M.E., CLARKE, R.T., & SIMCOX, D.J. 1998. The ecology of *Myrmica* ants in relation to the conservation of *Maculinea* butterflies. *Journal of Insect Conservation* **2**: 67-78. [GOT]

ELMES, G.W., WARDLAW, J.C., SCHONRIGGE, K., THOMAS, J.A., & CLARKE, R.T. 2004. Food stress causes differential survival of socially parasitic caterpillars of *Maculinea rebeli* integrated in colonies of host and non-host *Myrmica* ant species. *Entomologia Experimentalis et Applicata* **110** (1): 53-63.

ELMES, G.W., WARDLAW, J.C., & THOMAS, J.A. 1991. Larvae of *Maculinea rebeli*, a large-blue butterfly and their *Myrmica* host ants: patterns of caterpillar growth and survival. *Journal of Zoology (London)* **224** (1): 79-92.

ENDERSBY, I.D. 1995. Some aspects of the biology and behaviour of *Paralucia pyrodiscus lucida* Crosby (Lepidoptera Lycaenidae) at Eltham, Victoria. *Royal Society of Victoria Proceedings* **107** (2): 83-94. [*Notoncus enormis*]

FAITHFULL, I. 1986. *Acacia pravissima*, another larval food plant for the Australian hairstreak, *Pseudalmenus chlorinda zephyrus* (Lycaenidae). *Victorian Entomologist* **16** (6): 78-79. [*Iridomyrmex biconvexus*]

FERGUSON, D.J. 1983. *Ogyris amaryllis amata* Waterhouse (Lepidoptera: Lycaenidae) tended by *Camponotus* ants. *Australian Entomological Magazine* **10** (4): 58. [Australia]

FFRENCH-CONSTANT, H. 1981. *An investigation into the oviposition sites of* Maculinea arion *(the large blue) and of their neihbouring ant species*. Published by the Author (University of Exeter): 1-18. [*Myrmica sabuleti*; Switzerland]

FIEDLER, K. 1987. *Tetramorium caespitum* (Linnaeus, 1758) (Hymenoptera: Formicidae), eine weitere mit *Polyommatus coridon* (Poda, 1761) (Lepidoptera: Lycaenidae) vergesellschaftete Ameisenart. *Nachrichten des Entomologischen Vereins Apollo* **8** (2): 60. [Germany]

FIEDLER, K. 1988. Die Bezichungen von Blaulingspuppen (Lepidoptera: Lycaenidae) zu Ameisen (Hymenoptera: Formicidae). *Nachrichten des Entomologischen Vereins Apollo* **9** (1): 33-58. [Formicidae]

FIEDLER, K. 1989a. Differences in the behaviour of ants towards two larval instars of *Lycaena tityrus* (Lep., Lycaenidae). *Deutsche Entomologische Zeitschrift* **36** (4-5): 267-271. [*Tetramorium caespitum*]

FIEDLER, K. 1989b. Russeltrillern: eine neue Form taktiler Kommunikation zwischen Blaulingen und Ameisen. *Nachrichten des Entomologischen Vereins Apollo* **10** (2): 125-132. [*Allotinus unicolor*; *Anoploleis longipes*; Malaysia]

FIEDLER, K. 1989c. New information on the biology of *Maculinea nausithous* and *M. teleius* (Lepidoptera: Lycaenidae). *Nota Lepidopterologica* **12** (4): 246-256. [*Myrmica rubra*; Germany]

FIEDLER, K. 1990a. Bermerkungen zur Larvalbiologie von *Callophrys rubi* L. (Lepidoptera: Lycaenidae). *Nachrichten des Entomologischen Vereins Apollo* **11** (3): 121-141.

FIEDLER, K. 1990b. Effects of laral diet on myrmecophilous qualities of *Polyommatus icarus* caterpillars (Lepidoptera: Lycaenidae). *Oecologia (Berlin)* **83** (2): 284-287. [*Lasius flavus*; *Tetramorium caespitum*]

FIEDLER, K. 1990c. Beobachtungen bei der Zucht von *Polyommatus icarus* Rott. (Lep., Lycaenidae) auf verschiedenen Futterplanzen. *Nachrichten des Entomologischen Vereins Apollo* **11** (1): 1-9. [*Tetramorium caespitum*]

FIEDLER, K. 1991. Systematic, evolutionary, and ecological implications of myrmecophily within the Lycaenidae (Insecta: Lepidoptera: Papilionoidea). *Bonner Zoologische Monographien* No. 31: 1-210. [General reference]

FIEDLER, K. 1992a. Recent contributions to the behavioural ecology and evolution of lycaenid-ant associations (Lepidoptera, Lycaenidae). *Nota Lepidopterologica Supplement* **4**: 11-13. [General reference]

FIEDLER, K. 1992b. Notes on the biology of *Hypolycaena othona* (Lepidoptera: Lycaenidae) in west Malaysia. *Nachrichten des Entomologischen Vereins Apollo* **13** (2): 65-92. [Formicidae]

FIEDLER, K. 1992c. The life-history of *Surendra florimel* Doherty 1889 (Lepidoptera: Lycaenidae) in west Malaysia. *Nachrichten des Entomologischen Vereins Apollo* **13** (2): 107-135. [Formicidae]

FIEDLER, K. 1994a. Lycaenid butterflies and plants: is myrmecophily associated with amplified hostplant diversity? *Ecological Entomology* **19** (1): 79-82. [General reference]

FIEDLER, K. 1994b. Observations on the biology of *Eooxylides tharis* (Lepidoptera: Lycaenidae). *Nachrichten des Entomologischen Vereins Apollo* **14** (4): 325-337. [Formicidae; Malaysia]

FIEDLER, K. 1995a. Lycanid butterflies and plants: hostplant relationships, tropical versus temperate. *Ecotropica* **1** (1): 51-58. [General reference]

FIEDLER, K. 1995b. Lycaenid butterflies and plants: is myrmecophily associated with particular hostplant preferences? *Ethology Ecology and Evolution* **7** (2): 107-132. [General reference]

FIEDLER, K. 1996a. Host-plant relationships of lycaenid butterflies: large-scale patterns, interactions with plant chemistry, and mutualism with ants. *Entomologia Experimentalis et Applicata* **80** (1): 259-267. [General reference]

FIEDLER, K. 1996b. Interactions between lycaenid butterflies and ants in Peninsular Malaysia. *Monographiae Biologicae* **74**: 291-296.

FIEDLER, K. 1998a. Lycaenid-ant interactions of the *Maculinea* type: tracing their historical roots in a comparative framework. *Journal of Insect Conservation* **2**: 3-14. [GOT]

FIEDLER, K. 1998b. Geographical patterns in life-history traits of Lycaenidae butterflies – ecological and evolutionary implications. *Zoology (Jena)* **100** (4): 336-347. [Review]

FIEDLER, K. 2001. Ants that associate with Lycaeninae butterfly larvae: Diversity, ecology and biogeography. *Diversity and Distributions* **7** (1-2): 45-60. [General reference]

FIEDLER, K. 2006. Ant-associates of Palaearctic lycaenid butterfly larvae (Hymenoptera: Formicidae; Lepidoptera: Lycaenidae) – a review. *Myrmecologische Nachrichten* **9**: 77-87.

FIEDLER, K. 2012. The host genera of ant-parasitic Lycaenidae butterflies: A review. *Psyche (Cambridge)* 1-10 Article ID 153975.

Abstract: Numerous butterfly species in the family Lycaenidae maintain myrmecophilous associations with trophobiotic ants, but only a minority of ant-associated butterflies are parasites of ants. *Camponotus*, *Crematogaster*, *Myrmica*, and *Oecophylla* are the most frequently parasitized ant genera. The distribution of ant-parasitic representatives of the Lycaenidae suggests that only *Camponotus* and *Crematogaster* have multiply been invaded as hosts by different independent butterfly lineages. A general linear model reveals that the number of associated nonparasitic lycaenid butterfly species is the single best predictor of the frequency of parasitic interactions to occur within an ant genus. Neither species richness of invaded ant genera nor their ecological prevalence or geographical distribution contributed significantly to that model. Some large and dominant ant genera, which comprise important visitors of ant-mutualistic lycaenids, have no (*Formica*, *Dolichoderus*) or very few ant-parasitic butterflies (*Lasius*, *Polyrhachis*) associated with them.

FIEDLER, K., & BALINT, Z. 1993. European and north west African Lycaenidae and their association with ants. *Janus Pannonius Muzeum Evkonyve* **37**: 65-78. [Formicidae; Palaearctic]

FIEDLER, K., & BALINT, Z. 1994. Observations on the symbiosis of *Plebejus sephirus* (Lepidoptera, Lycaenidae) caterpillars with ants. *Janus Pannonius Muzeum Evkonyve* **38**: 61-66. [Formicidae; Hungary]

FIEDLER, K., & HAGEMANN, D. 1995. The influence of larval age and ant number on the myrmecophilous interactions of the African grass blue butterfly, *Zizeeria knysna* (Lepidoptera: Lycaenidae). *Journal of Research on the Lepidoptera* **31** (3-4): 213-232. [Afrotropical; *Lasius flavus*]

FIEDLER, K., & HOLLDOBLER, B. 1992. Ants and *Polyommatus icarus* immatures (Lycaenidae) – sex-related developmental benefits and costs of ant attendance. *Oecologia (Berlin)* **91** (4): 468-473. [*Lasius flavus*; *Lasius niger*]

FIEDLER, K., HOLLDOBLER, B., & SEUFERT, P. 1996. Butterflies and ants: the communicative domain. *Experientia (Basel)* **52** (1): 14-24. [Review]

FIEDLER, K., & HUMMEL, V. 1995. Myrmecophily in the brown argus butterfly, *Aricia agestis* (Lepidoptera: Lycaenidae): effects of larval age, ant number and persistence of contact with ants. *Zoology (Jena)* **99** (2): 128-137. [*Lasius*]

FIEDLER, K., & MASCHWITZ, U. 1989a. Adult myrmecophily in butterflies: the role of the ant *Anoplolepis longipes* in the feeding and oviposition behaviour of *Allotinus unicolor* (Lepidoptera, Lycaenidae). *Tyo To Ga* **40** (4): 241-251. [Malaysia]

FIEDLER, K., & MASCHWITZ, U. 1989b. The symbiosis between the weaver ant, *Oecophylla smaragdina*, and *Anthene emolus*, an obligate myrmecophilous lycaenid butterfly. *Journal of Natural History* **23** (4): 833-846. [Malaysia]

FIEDLER, K., & MASCHWITZ, U. 1989c. Functional analysis of the myrmecophilous relationships between ants (Hymenoptera: Formicidae) and lycaenids (Lepidoptera: Lycaenidae). 1. Release of food recruitment in ants by lycaenid larvae and pupae. *Ethology* **80** (1-4): 71-80. [*Lycaena tityrus*; *Tetramorium caespitum*]

FIEDLER, K., & MASCHWITZ, U. 1989d. Functional analysis of the myrmecophilous relationships between ants (Hymenoptera: Formicidae) and lycaenids (Lepidoptera: Lycaenidae). 2. Lycaenid larvae as trophobiotic partners of ants – a quantitative approach. *Oecologia (Berlin)* **75** (2): 204-206. [*Polyommatus coridon*; *Tetramorium caespitum*]

FIEDLER, K., & MASCHWITZ, U. 1989e. Functional analysis of the myrmecophilous relationships between ants (Hymenoptera: Formicidae) and lycaenids (Lepidoptera: Lycaenidae). 3. New aspects of the function of the retractile tentacular organs of lycaenid larvae. *Zoologische Beitraege* **31** (3): 409-416. [*Polyommatus coridon*; *Plagiolepis pygmaea*]

FIEDLER, K., & ROSCISZEWSKI, K. 1990. *Myrmica sabuleti* (Hym., Formicidae) – ein weiterer Symbiosepartner von *Polyommatus coridon* (Lep., Lycaenidae). *Nachrichten des Entomologischen Vereins Apollo* **11** (3): 141-142. [Germany]

FIEDLER, K., & SAAM, C. 1994. Does ant-attendance influence development in 5 European Lycaenidae butterfly species? *Nota Lepidopterologica* **17** (1-2): 5-24. [*Lasius niger*; *Lasius flavus*]

FIEDLER, K., & SAAM, C. 1995a. Ants benefit from attending facultatively myrmecophilous Lycaenidae caterpillars: evidence from a survival study. *Oecologia (Berlin)* **104** (3): 316-322. [*Lasius*; *Myrmica*]

FIEDLER, K., & SAAM, C. 1995b. A "microbial cost" of butterfly-ant mutualisms (Lycaenidae). *Journal of the Lepidopterists' Society* **49** (1): 80-84. [*Polyommatus bellargus*; *Polyommatus icarus*]

FIEDLER, K., SCHURIAN, K.G., & HAHN, M. 1994. The life-history and myrmecophily of *Polyommatus candalus* (Herrich-Schaffer) from Turkey (Lep., Lycaenidae). *Linneana Belgica* **14** (6): 315-332. [*Lasius flavus*]

FIEDLER, K., SCHURIAN, K.G., & SEUFERT, P. 1992. Neue Beobachtungen zu Ameisenassoziationen europaischer Blaulingsraupen (Lepidoptera: Lycaenidae).

Mitteilungen des Internationalen Entomologischen Vereins E. V. Frankfurt A.M. **17** (3): 121-130. [Palaearctic]

FIEDLER, K., & SEUFERT, P. 1995. The mature larva and pupa of *Semanga superba* (Lepidoptera: Lycaenidae). *Nachrichten des Entomologischen Vereins Apollo* **16** (1): 1-12. [*Dolichoderus*]

FIEDLER, K., SEUFERT, P., MASCHWITZ, U., & IDRIS, Hj 1995. Notes on larval biology and pupal morphology of Malaysian *Curetis* butterflies (Lepidoptera: Lycaenidae). *Tyo To Ga* **45** (4): 287-299. [*Curetis bulis*; *Curetis santana*; Formicidae]

FIEDLER, K., SEUFERT, P., PIERCE, N.E., PEARSON, J.G., & BAUMGARTEN, H.T. 1995. Exploitation of lycaenid-ant mutualisms by braconid parasitoids. *Journal of Research on the Lepidoptera* **31** (3-4): 153-168. [General reference]

FIELD, R.P. 1997. The *Ogyris idmo* Hewitson complex (Lepidoptera: Lycaenidae) as flagship species for conservation in southern Australia. *Memoirs of Museum Victoria* **56** (2): 389-392. [*Camponotus*]

FIGURNY-PUCHALSKA, E., GADEBERG, R.M.E., & BOOMSMA, J.J. 2000. Comparison of genetic population structure of the large blue butterflies *Maculinea nausithous* and *M. telius*. *Biodiversity and Conservation* **9** (3): 419-432. [*Myrmica*]

FIGURNY-PUCHALSKA, E., & WOYCIECHOWSKI, M. 1998. Flowerhead selection for oviposition by females of the sympatric butterfly species *Maculinea teleius* and *M. nausithous* (Lepidoptera: Lycaenidae). *Entomologia Generalis* **23** (3): 215-222.

FILZ, K.J. & SCHMITT, T. 2015. Niche overlap and host specificity in parasitic *Maculinea* butterflies (Lepidoptera: Lycaenidae) as a measure for potential extinction risks under climate change. *Organisms Diversity & Evolution* **15** (3): 555-565.

FORISTER, M.L., GOMPERT, Z., NICE, C.C., FORISTER, G.W. & FORDYCE, J.A. 2011. Ant association facilitates the evolution of diet breadth in a lycaenid butterfly. *Proceedings of the Royal Society Biological Sciences Series B* **278** (1711): 1539-1547. [*Lycaeides melissa*]

FRASER, A.M., AXEN, A.H., & PIERCE, N.E. Assessing the quality of different ant species as partners of a myrmecophilous butterfly. *Oecologia (Berlin)* **129** (3): 452-460. [*Glaucopsyche lygdamus*]

FRASER, A.M., TREGENZA, T., WEDELL, N., ELGAR, M.A., & PIERCE, N.E. 2002. Oviposition tests of ant preference in a myrmecophilous butterfly. *Journal of Evolutionary Biology* **15** (5): 861-870.

FRIC, Z., WAHLBERG, N., PECH, P. & ZRZAVY, J. 2007. Phylogeny and classification of the *Phengaris-Maculinea* clade (Lepidoptera: Lycaenidae): total evidence and phylogenetic species concepts. *Systematic Entomology* **32** (3): 558-567.

FUERST, M.A., DUREY, M. & NASH, D.R. 2012. Testing the adjustable threshold model for intruder recognition on *Myrmica* ants in the context of a social parasite. *Proceedings of the Royal Society Biological Sciences Series B* **279** (1728): 516-522.

Abstract: Social insect colonies are like fortresses, well protected and rich in shared stored resources. This makes them ideal targets for exploitation by predators, parasites and competitors. Colonies of *Myrmica rubra* ants are sometimes exploited by the parasitic butterfly *Maculinea alcon*. *Maculinea alcon* gains access to the ants' nests by mimicking their cuticular hydrocarbon recognition cues, which allows the parasites to blend in with their host ants. *Myrmica rubra* may be particularly susceptible to exploitation in this fashion as it has large, polydomous colonies with many queens and a very viscous population structure. We studied the mutual aggressive behaviour of *My. rubra* colonies based on predictions for recognition effectiveness. Three hypotheses were tested: first, that aggression increases with distance (geographical, genetic and chemical); second, that the more queens present in a colony and therefore the less-related workers within a colony, the less aggressively they will behave; and that colonies facing

parasitism will be more aggressive than colonies experiencing less parasite pressure. Our results confirm all these predictions, supporting flexible aggression behaviour in *Myrmica* ants depending on context.

FUNK, R.S. 1975. Association of ants with ovipositing *Lycaena rubidus* (Lycaenidae). *Journal of the Lepidopterists' Society* **28** (4): 261-262.

FURST, M.A. & NASH, D.V. 2010. Host ant independent oviposition in the parasitic butterfly *Maculinea alcon*. *Biology Letters* **6** (2): 174-176.

GANAHA, T., OKAMOTO, C. & YUKAWA, J. 2007. Utilization of aphid leaf-roll galls on lammas shoots of *Prunus xyedoensis* Matsumura (Rosaceae) by a myrmecophilous butterfly *Niphanda fusca* (Bremer et Grey) (Lepidoptera, Lycaenidae) for oviposition sites. *Transactions of the Lepidopterological Society of Japan* **58** (4): 413-420.

GARBE, H. 1993. Hinweise zum Schutz des gefahrdeten 'Dunklen Ameisenblaulings' *Maculinea nausithous* Bergstr. 1779 (Lepidoptera: Lycaenidae). *Nachrichten des Entomologischen Vereins Apollo* **14** (1): 33-39. [*Myrmica rubra*; Germany]

GEISSLER-STROBEL, S. 1999. Landschaftsplanungsorientierte Studien zu Okologie, Verbreitung, Gefahrdung und Schutz der Wiesenknopf-Ameisen-Blaulinge *Glaucopsyche* (*Maculinea*) *nausithous* und *Glaucopsyche* (*Maculinea*) *teleius*. *Neue Entomologische Nachrichten* **44**: 1-105. [*Mrymica* spp.]

GIL-T, F. 2004. Nuevos datos sobre la biologia de *Iolana iolas* Ochsenheimer (Lepidoptera, Lycaenidae) y su interaccion con himenopteros mirmecofilos, fitofagos y parasitoides (Hymenoptera, Formicidae, Eurytomidae, Ichneumonoidea). *Boletin de la SEA* **34**: 139-145.

GRIEBELER, E.M., PAULER, R., & POETHKE, H.J. 1995. *Maculinea arion* (Lepidoptera: Lycaenidae): ein Beispiel fur die Deduktion von Naturschutzmassnahmen aus einem Modell. *Verhandlungen der Gesellschaft fuer Oekologie* **24**: 201-206. [*Myrmica*]

GRIEBELER, E.M., & SEITZ, A. 2002. An individual based model for the conservation of the endangered Large Blue Butterfly, *Maculinea arion* (Lepidoptera: Lycaenidae). *Ecological Modelling* **156** (1): 43-60.

GRIESE, F. 1995. Les lepidopteres rhopaloceres myrmecophiles de Belgique. 2. La vulnerabilite des especes myrmecophiles. *Bulletin et Annales de la Societe Royale Belge d'Entomologie* **131** (1): 17-23.

GRIESE, F. 1995. Complements a la liste des lepidopteres rhopaloceres myrmecophiles de Belgique. *Lambillionea* **95** (1): 43-50.

GRILL, A., CLEARY, D.F.R., STETTMER, C., BRAEU, M. & SETTELE, J. 2008. A mowing experiment to evaluate the influence of management on the activity of host ants of *Maculinea* butterflies. *Journal of Insect Conservation* **12** (6): 617-627.

GRUNDEL, R., PAVLOVIC, N.B., & SULZMAN, C.L. 1998. The effect of canopy cover and seasonal change on host plant quality for the endangered Karner blue butterfly (*Lycaeides melissa samuelis*). *Oecologia (Berlin)* **114** (2): 243-250.

GUTIERREZ, D., FERNANDEZ, P., SEYMOUR, A.S., & JORDANO, D. 2005. Habitat distribution models: Are mutualist distributions good predictors of their associates? *Ecological Applications* **15** (1): 3-18. [*Plebejus argus*; *Lasius niger*; habitat distribution modelling]

HAACK, R.A. 1993. The endangered Karner blue butterfly (Lepidoptera: Lycaenidae): biology, management considerations and data gaps. *U S Forest Service General Technical Report NC* **161**: 83-100. [*Lycaeides melissa samuelis*]

HABEL, J.C., SCHMITT, T., HAERDTLE, W., LUETKEPOHL, M. & ASSMAN, T. 2007. Dynamics in a butterfly-plant-ant system: influence of habitat characteristics on turnover

rates of the endangered lycaenid *Maculinea alcon*. *Ecological Entomology* **32** (5): 536-543.

HACOBIAN, B.S. 1992. New distribution records of the green tree ant *Oecophylla smaragdina* (Fabricius) (Hymenoptera: Formicidae: Formicinae) and three associated lycaenid butterflies. *Australian Entomological Magazine* **19** (4): 111-113. [*Arhopala centaurus*; *Arhopala micale*; *Hypolycaena phorbas*; Australia]

HALL-CUSHMAN, J., & MURPHY, D.D. 1993a. Susceptibility of lycaenid butterflies to endangerment. *Wings* **17** (2): 16-21. [USA]

HALL-CUSHMAN, J., & MURPHY, D.D. 1993b. Conservation of North American lycaenids – an overview. *Occasional Papers of the IUCN Species Survival Commission (SCC)* **8**: 37-44. [Formicidae; Nearctic Region]

HALL-CUSHMAN, J., RASHBROOK, V.K., & BEATTIE, A.J. 1994. Assessing benefits to both participants in a lycaenid-ant association. *Ecology (Washington DC)* **75** (4): 1031-1041. [*Paralucia aurifera*; *Iridomyrmex nitidiceps*; Australia]

HARVEY, D.J. 1980. Ants associated with *Harkenclenus titus*, *Glaucopsyche lygdamas*, and *Celastrina argiolus* (Lycaenidae). *Journal of the Lepidopterists' Society* **34** (4): 365-367.

HARVEY, D.J. 1987. *The higher classification of the Riodinidae (Lepidoptera)*. The University of Texas, Aistin: 1-216.

HARVEY, D.J., & LONGINO, J. 1989. Myrmecophily and larval food plants of *Brephidium isophthalma pseudofea* (Lycaenidae) in the Florida Keys. *Journal of the Lepidopterists' Society* **43** (4): 332-333. [*Tapinoma sessile*]

HEATH, A. 1997a. A review of African genera of the tribe Aphnaeini (Lepidoptera: Lycaenidae). *Metamorphosis Occasional Supplement* **2**: 1-60. [Afrotropical]

HEATH, A. 1997b. Myrmecophily and the male genitalia of African Lycaenidae: a preliminary discussion. *Metamorphosis Occasional Supplement* **3**: 89-97. [Afrotropical]

HEATH, 1998. Further aspects on the life history of the myrmecophilous species *Chrysoritis dicksoni* (Gabriel), (Lepidoptera: Lycaenidae). *Metamorphosis* **9** (4): 160-172. [Afrotropical; *Crematogaster*]

HEATH, A., & BRINKMAN, A.K. 1995a. Aspects of the life history, distribution and population fluctuations of *Oxychaeta dicksoni* (Gabriel) (Lepidoptera: Lycaenidae). *Metamorphosis* **6** (3): 117-127. [Afrotropical; *Crematogaster perengueyi*]

HEATH, A., & BRINKMAN, A.K. 1995b. Notes on the early stages of *Argyrocupha malagrida maryae* (Wallengren) (Lepidoptera, Lycaenidae). *Metamorphosis* **6** (4): 167-173. [Afrotropical; *Anoplolepis custodiens*]

HEATH, A., & CLAASSENS, A.J.M. 2000. New observations of ant associations and life history adaptations (Lepidoptera: Lycaenidae) in South Africa. *Metamorphosis* **11** (1): 3-19. [Afrotropical]

HEATH, A., & CLAASSENS, A.J.M. 2003. Ant-association among southern African Lycaenidae. *Journal of the Lepidopterists' Society* **57** (1): 1-16. [Afrotropical]

HEATH, A., McLEOD, L., KALISZEWSKA, Z.A., FISHER, C.W.S. & CORNWALL, M. 2008. Field notes including a summary of trophic and ant-associations for the butterfly genera *Chrysoritis* Butler, *Aloeides* Hübner and *Thestor* Hübner (Lepidoptera: Lycaenidae) from South Afirca. *Metamorphosis* **19** (3): 127-148.

HENNING, S.F. 1982. Chemical communication between lycaenid larvae (Lepidoptera: Lycaenidae) and ants (Hymenoptera: Formicidae). *Zoological Society of Southern Africa Occasional Bulletin* No. 2: 155. [General reference]

HENNING, S.F. 1983a. Biological groups within the Lycaenidae (Lepidoptera). *Journal of the Entomological Society of Southern Africa* **46** (1): 65-85. [Review]

HENNING, S.F. 1983b. Chemical communication between lycaenid larvae (Lepidoptera: Lycaenidae) and ants (Hymenoptera: Formicidae). *Journal of the Entomological Society of Southern Africa* **46** (2): 341-366. [General reference]

HENNING, S.F. 1984a. The effect of ant association on lycaenid larval duration (Lepidoptera: Lycaenidae). *Entomologist's Record and Journal of Variation* **96** (5-6): 99-102. [Afrotropical; South Africa]

HENNING, S.F. 1984b. Life history and behaviour of the rare myrmecophilous lycaenid *Erikssonia acraeina* Trimen (Lepidoptera: Lycaenidae). *Journal of the Entomological Society of Southern Africa* **47** (2): 337-342. [Afrotropical; *Acantholepis* (now *Lepisiota*); South Africa]

HENNING, S.F. 1987a. Myrmecophily in lycaenid butterflies (Lepidoptera: Lycaenidae). *Entomologist's Record and Journal of Variation* **99** (9-10): 215-222. [Review]

HENNING, S.F. 1987b. Myrmecophily in lycaenid butterflies (Lepidoptera: Lycaenidae). *Entomologist's Record and Journal of Variation* **99** (11-12): 261-267. [Review]

HENNING, S.F. 1987c. Myrmecophilous Lycaenidae (or how ants help butterflies). *South African Journal of Science* **83** (1): 9-10. [Afrotropical; Formicidae; conservation aspects; South Africa]

HENNING, S.F. 1997. Chemical communication between lycaenid larvae (Lepidoptera: Lycaenidae) and ants (Hymenoptera: Formicidae). *Metamorphosis Occasional Supplement* **3**: 66-81. [Afrotropical; *Aloeides dentatis, Lepisiota, Lepidochrysops ignota, Camponotus*]

HENRIQUE, A., PORTUGAL, A., & TRIGO, J.R. 2005. Similarity of cuticular lipids between a caterpillar and its host plant: A way to make prey undetectable for predatory ants? *Journal of Chemical Ecology* **31** (11): 2551-2561.

HESSELBARTH, G., VAN OORSCHOT, H., & WAGENEER, S. 1995. *Die Tagfalter der Turkei unter Berucksichtigung der angrenzenden Lander. Allgemeiner Teil, spezieller Teil. Band 1. Hesperiidae, Papilionidae, Pieridae, Lycaenidae*. Selbstverlag Sigbert Wagener, Hemdener Weg 19, D 46399 Bocholt, Germany: 1-754.

HILL, C.J. 1993. The myrmecophilous organs of *Arhopala madytus* Fruhstorfer (Lepidoptera: Lycaenidae). *Journal of the Australian Entomological Society* **32** (3): 283-288. [*Oecophylla smaragdina*; Australia]

HIRUKANO, N., & KOBAYASHI, M. 1995. Life history of *Shirozua jonasi* (Janson) (Lepidoptera, Lycaenidae) in Kiso-dani, Nagano Prefecture, 1. *Tyo To Ga* **45** (4): 224-238. [Formicidae; Japan]

HIRUKANO, N., & KOBAYASHI, M. 1995. Life history of *Shirozua jonasi* (Janson) (Lepidoptera, Lycaenidae) in Kiso-dani, Nagano Prefecture, 2. *Tyo To Ga* **45** (4): 269-286. [*Lasius fuliginosus*; Homoptera; Japan]

HOCHBERG, M.E., CLARKE, R.T., ELMES, G.W., & THOMAS, J.A. 1994. 1994. Population dynamic consequences of direct and indirect interactions involving a large blue butterfly and its plant and red ant hosts. *Journal of Animal Ecology* **63** (2): 375-391. [*Maculinea rebeli*; *Myrmica schencki*]

HOCHBERG, M.E., ELMES, G.W., THOMAS, J.A., & CLARKE, R.T. 1996. Mechanisms of local persistence in coupled host-parasitoid associations: the case model of *Maculinea*

rebeli and *Ichneumon eumerus*. *Royal Society Philosophical Transactions Biological Sciences* **351** (1348): 1713-1724. [*Myrmica*]

HOCHBERG, M.E., THOMAS, J.A., & ELMES, G.W. 1992. A modelling study of the population dynamics of a large blue butterfly, *Maculinea rebeli*, a parasite of red ant nests. *Journal of Animal Ecology* **61** (2): 397-409. [*Myrmica schencki*]

HOETTINGER, H., SCHLICK-STEINER, B.C., & STEINER, F.M. 2003. The alcon blue *Maculinea alcon*, (Lepidoptera: Lycaenidae) in eastern Austria: Status and conservation measures. *Ekologia (Bratislava)* **22** (2): 107-118.

HOJO, M.K., PIERCE, N.E. & TSUJI, K. 2015. Lycaenid caterpillar secretions manipulate attendant ant behavior. *Current Biology* **25** (17): 2260-2264.

HOJO, M.K., WADA-KATSUMATA, A., AKINO, T., YAMAGUCHI, S., OZAKI, M. & YAMAOKA, R. 2009. Chemical disguise as particular caste of host ants in the ant inquiline parasite *Niphanda fusca* (Lepidoptera: Lycaenidae). *Proceedings of the Royal Society Biological Sciences Series B* **276** (1656): 551-558. [*Niphanda fusca*, *Camponotus japonicus*]

HOJO, M.K., WADA-KATSUMATA, A., OZAKI, M., YAMAGUCHI, S. & YAMAOKA, R. 2008. Gustatory synergism in ants mediates a species-specific symbiosis with lycaenid butterflies. *Journal of Comparative Physiology A Sensory Neural and Behavioral Physiology* **194** (12): 1043-1052. [*Niphanda fusca*, *Camponotus japonicus*, *Camponotus obscuripes*]

HOJO, M.K., YAMAGUCHI, S., AKINO, T. & YAMAOKA, R. 2014. Adoption of lycaenid *Niphanda fusca* (Lepidoptera: Lycaenidae) caterpillars by the host ant *Camponotus japonicus* (Hymenoptera: Formicidae). *Entomological Science* **17** (1): 59-65.

HOJO, M.K., YAMAMOTO, A., AKINO, T., TSUJI, K. & YAMAOKA, R. 2014. Ants use partner specific odors to learn to recognize a mutualistic partner. *PloS ONE* **9** (1): 1-8.

HOJO, M.K., YAMAMOTO, A., AKINO, T., TSUJI, K. & YAMAOKA, R. 2014. Ants use partner specific odors to learn to recognize a mutualistic partner. *PLOS ONE* **9** (1): Article Number e86054.

HORVITZ, C.C., & SCHEMSKE, D.W. 1984. Effects of ants and an ant-tended herbivore on seed production of a Neotropical herb. *Ecology (Washington DC)* **65** (5): 1369-1378. [*Eurybia elvina*; Mexico]

HORVITZ, C.C., TURNBULL, C., & HARVEY, D.J. 1987. Biology of immature *Eurybia elvina* (Lepidoptera: Riodinidae), a myrmecophilous metalmark butterfly. *Annals of the Entomological Society of America* **80** (4): 513-519. [Formicidae; Mexico]

HUNT, L., MOORE, M., & MOORE, D. 1998. Rediscovery of *Ogyris idmo halmaturia* (Tepper 1890). *Victorian Entomologist* **28** (6): 113-116. [*Camponotus terebrans*]

INOUE, T., HAMAGUCHI, K. & HISAMATSU, M. 2007. An ant species accompanying larvae of *Shirozua jonasi* (Janson) (Lepidoptera: Lycaenidae) observed in Ibaraki Prefecture, central Japan. *Bulletin of Ibaraki Nature Museum* **10**: 17-18. [*Lasius nipponensis*]

INUI, Y., SHIMIZU-KAYA, U., OKUBO, T., YAMSAKI, E. & ITIOKA, T. 2015. Various chemical strategies to deceive ants in three *Arhopala* species (Lepidoptera: Lycaenidae) exploiting *Macaranga* myrmecophytes. *PLOS ONE* **10** (4): Article Number UNSP e0120652.

JACKSON, D.E. 2008. Interspecific communication: treehopper alarms make ants come running. *Current Biology* **18** (14): R602-R603.

JANSEN, S.H.D.R., HOLMGREN, M., & WYNHOFF, I. 2006. Blues in the Roer Valley – habitat selection and behaviour of *Maculinea nausithous* butterflies. *Proceedings of the Section Experimental and Applied Entomology of the Netherlands Entomological Society* **17**: 45-50.

JOHNSON, S.J., & VALENTINE, P.S. 1986. Observations on *Liphyra brassolis* Westwood (Lepidoptera: Lycaenidae) in north Queensland. *Australian Entomological Magazine* **13** (1-2): 22-26. [*Oecophylla smaragdina*]

JOHNSTON, G. 1981. A diet of aphids *Taraka hamada isona* (Lycaenidae). *News British Butterfly Conservation Society* No. 26: 27-29.

JORDANO, D., RODRIGUEZ, J., THOMAS, C.D., & FERNANDEZ-HAEGER, J. 1992. The distribution and density of a lycaenid butterfly in relation to *Lasius* ants. *Oecologia (Berlin)* **91** (3): 439-446. [*Plebejus argus*]

JORDANO, D., & THOMAS, C.D. 1992. Specificity of an ant-lycaenid interaction. *Oecologia (Berlin)* **91** (3): 431-438. [*Plebejus argus*; *Formica*; *Lasius niger*; *Myrmica*]

JOY, J. 1992. Upstairs and downstairs – butterflies and ants. *Shropshire Naturalist* **1** (1): 11-16. [*Plebejus argus*; Formicidae; England]

JUTZELER, D. 1989a. *Maculinea rebeli* (Hirschke): ein Raupenfund im Glarnerland (Lepidoptera: Lycaenidae). *Mitteilungen der Entomologischen Gesellschaft Basel* **39** (3): 92-93. [*Myrmica sulcinodis*; Switzerland]

JUTZELER, D. 1989b. Eine Besucherameise der Raupe von *Lysandra bellargus* Rott. (Lepidoptera: Lycaenidae). *Mitteilungen der Entomologischen Gesellschaft Basel* **39** (3): 94. [*Myrmica sabuleti*; Switzerland]

JUTZELER, D. 1989c. Kann das Weibchen von *Plebejus argus* (Linneaus, 1761) Ameisen riechen? (Lepidoptera: Lycaenidae). *Mitteilungen der Entomologischen Gesellschaft Basel* **39** (4): 150-159. [*Lasius*; Switzerland]

JUTZELER, D. 1990. Weibchen von *Lycaeides idas* (Linneaus, 1761) riechen ihre Wirtsameisen, Nachtrage aus den Jahren 1989 und 1990 (Lepidoptera: Lycaenidae). *Mitteilungen der Entomologischen Gesellschaft Basel* **40** (1-2): 66-71. [*Formica*; Switzerland]

KAMINSKI, L.A. 2008. Polyphagy and obligate myrmecophily in the butterfly *Hallonympha paucipuncta* (Lepidoptera: Riodinidae) in the Neotropical Cerrado savanna. *Biotropica* **40** (3): 390-394.

KAMINSKI, L.A. & CARVALHO-FILHO, F.S. 2012. Life history of *Aricoris propitia* (Lepidoptera: Riodinidae) – A myrmecophilous butterfly obligately associated with fire ants. *Psyche (Cambridge)*: 1-10 Article ID 126876.

Abstract: The immature stages of *Aricoris propitia* (Stichel) are described and illustrated for the first time, using both light and scanning electron microscopy. Females oviposit in at least seven host-plant families, always in the presence of fire ants (*Solenopsis saevissima* (Smith) complex), without being attacked by them. Larvae are tended by ants during all larval and pupal stages. From the fourth instar on, larvae feed at night and rest during the day inside underground shelters constructed by ants on the host plant roots, and where pupation occurs. Several observed features, including ant-mediated oviposition, persistent ant attendance throughout all instars, and high spatiotemporal fidelity indicate that *A. propitia* is a myrmecophile obligately associated with fire ants. We propose *A. propitia* as an extraordinary model for studies on ant-butterfly evolutionary history in the Neotropics.

KAMINSKI, L.A., MOTA, L.L., FREITAS, A.V.L. & MOREIRA, G.R.P. 2013. Two ways to be a myrmecophilous butterfly: natural history and comparative immature-stage morphology of two species of *Theope* (Lepidoptera: Riodinidae). *Biological Journal of the Linnean Society* **108** (4): 844-870.

Abstract: Symbiotic interactions between butterfly larvae and ants, termed myrmecophily, require a range of behavioural and morphological adaptations (ant-organs). Here, using light and scanning electron microscopy, we

describe the complete life cycle of two species of *Theope* (Lepidoptera: Riodinidae) that have contrasting ways of life. *Theope thestias* larvae are facultatively tended by several ant species, whereas *Theope pieridoides* have obligate symbiotic interactions with *Azteca* ants that inhabit a myrmecophytic tree. Morphological differences associated with their different degrees of intimacy with tending ants are visible from hatching. In *T.thestias*, the untended first-instar larva has elongated bifurcated setae and a few tiny perforated cupola organs (PCOs), whereas in *T.pieridoides*, the ant-tended first instar has short dendritic setae, larger and more numerous PCOs, and functional tentacle nectary organs (TNOs). Throughout ontogeny, *T.pieridoides* always shows more conspicuous ant-organs than *T.thestias*, with the exception of balloon setae, which are larger and more numerous in *T.thestias*. In addition, mature *T.pieridoides* larvae have an anterior set of ant-organs, including a new type, here described and termed anterior glandular openings (AGOs). Based on the behavioural responses of ants in contact with these structures, a new interpretation for the mechanism whereby *Theope* larvae can manipulate the behaviour of their tending ants is proposed. Until now, three ecological syndromes can be defined among *Theope* species: (1) oligophagous larvae with facultative myrmecophily; (2) monophagous larvae with obligate myrmecophily; and (3) polyphagous larvae with obligate myrmecophily. These results suggest that differences in the degree of specificity in the antplant interactions may have an important role in the evolution of host-plant use in *Theope*.

KAMINSKI, L.A. & RODRIGUES, D. 2011. Species-specific levels of ant attendance mediate performance costs in a facultative myrmecophilous butterfly. *Physiological Entomology* **36** (3): 208-214.

Abstract: Trophobiont butterfly larvae offer caloric rewards to ants through specialised glands and, in return, gain ant-derived protection from natural enemies. Thus, from the larva's perspective, the major cost of myrmecophily comprises the reward production. Larvae of the butterfly *Parrhasius polibetes* (Stoll) (Lycaenidae) are facultatively tended by several ant species, which might differ in the intensity of tending behaviour. The performance costs (development time, survival, pupal mass and adult dry mass) of *P. polibetes* are examined when tended by two ant species differing in size and foraging strategies (*Camponotus melanoticus* Emery and *Camponotus crassus* Mayr), along with the corresponding intensity of tending behaviour towards late instars. Untended larvae serve as controls. Larvae tended by *C. melanoticus* take longer to pupate compared with both *C. crassus* and control larvae. By contrast, pupae whose larvae are tended by *C. crassus* are lighter than control larvae but do not differ from those tended by *C. melanoticus*. No differences are found in the adult stage, indicating compensation in all cases. Both at short-and long-term scales, *C. melanoticus* tends larvae of *P. polibetes* more intensely than *C. crassus*. The increase in tending activity of *C. melanoticus* presumably delays the development time of larvae tended by this ant species. The results of the present study show that tending intensity varies depending on the ant species, and that *P. polibetes* has compensatory mechanisms to minimise myrmecophily costs, regardless of tending intensity. To the authors' knowledge, this is the first experimental evidence that intensity of ant-tending behaviour is species-specific and affects performance in a trophobiont insect.

KERY, M., MATTHIES, D., & FISCHER, M. 2001. The effect of plant population size on the interactions between the rare plant *Gentiana cruciata* and its specialized herbivore *Maculinea rebeli*. *Journal of Ecology* **89** (3): 418-427.

KITCHING, R..L. 1981. Egg clustering and the Southern Hemisphere lycaenids: comments on a paper by N.E. Stamp. *American Naturalist* **118** (3): 423-425. [Egg clustering related to myrmecophily]

KITCHING, R.L. 1983. Myrmecophilous organs of the larvae and pupa of the lycaenid butterfly *Jalmenus evagoras* (Donovan). *Journal of Natural History* **17** (3): 471-481. [*Tridomyrmex anceps*; Australia]

KITCHING, R.L. 1987. Aspects of the natural history of the lycaenid butterfly *Allotinus major* in Sulawesi. *Journal of Natural History* **21** (3): 535-544. [*Anoplolepis longipes*; Indonesia]

KITCHING, R.L., & LUKE, B. 1985. The myrmecophilous organs of the larvae of some British Lycaenidae (Lepidoptera): a comparative study. *Journal of Natural History* **19** (2): 259-276.

KITCHING, R.L., & TAYLOR, M.F.J. 1981. The culturing of *Jalmenus evagoras evagoras* (Donovan) and its attendant ant *Iridomyrmex anceps* (Roger). *Australian Entomological Magazine* **7** (5): 71-75. [Methods in laboratory; Australia]

KLASA, A., & WOYCIECHOWSKI, M. 1991. Introduction of the vanishing butterflies of the genus *Maculinea* into the Ojcow National Park. *Chronmy Przyrode Ojczysta* **47** (3): 31-38. [*Myrmica*; Poland]

KOBAYASHI, T., KITAHARA, M. & TANAKA, E. 2008. Effects of habitat fragmentation on the three-way interaction among ants, aphids and larvae of the giant purple emperor, *Sasakia charonda* (Hewitson), a near-threatened butterfly. *Ecological Research* **23** (2): 409-420.

KOCKELKE, K., HERMANN, G., KAULE, G., VERHAAGH, M., & SETTELE, J. 1994. Zur Autokologie und Verbreitung des Kreuzenzian-Ameisenblaulings, *Maculinea rebeli* (Hirschke, 1904). *Carolinea* **52**: 93-109. [*Myrmica*; Germany]

KORB, S.K. 1998. To the study of the associations of Formicidae (Hymenoptera) and Lycaenidae (Lepidoptera) in the middle part of European Russia. *Byulleten Moskovskogo Obshchestva Ispytatelei Prirody Otdel Biologicheskii* **103** (6): 45-47.

KOYAMA, T., & INOUE, T. 2004. Seasonal development of *Narathura bazalus* (Hewitson) (Lepidoptera: Lycaenidae) in the northern Kanto district, central Japan. *Japanese Journal of Entomology New Series* **7** (4): 143-153.

KUHN, J.J. 1998. Ant tending of *Arhopala* larvae in Papua New Guinea (Lepidoptera: Lycaenidae). *Tropical Lepidoptera* **9** (2): 58. [*Oecophylla*]

LAFRANCHIS, T., GIL-T., F. & LAFRANCHIS, A. 2007. New data on the ecology of 8 taxa of *Agrodiaetus* Huebner, 1822 from Greece and Spain: hostplants, associated ants and parasitoids (Lepidoptera, Lycaenidae, Hymenoptera, Diptera). *Atalanta (Marktleuthan)* **38** (1-2): 189-197, 313.

LAFRANCHIS, T. & LAFRANCHIS, A. 2012. Five blues on a flower: interactions between Polyommatinae butterflies (Lepidoptera, Lycaenidae), ants and parasitoids in the northern Peloponnese (Greece). *Nachrichten des Entomologischen Vereins Apollo*. **33** (1): 23-29.

Abstract: A field study undertaken on the slopes of Mt. Klokos (Peloponnese, Greece) completed by rearings in 2005-2007 has revealed the particular relationship between the community of Polyommatinae caterpillars feeding on the sainfoin *Onobrychis ebenoides* Boiss.& Sppruner, their parasitoids and 10 species of attending ants.

LAMBKIN, T.A., MEYER, C.E., BROWN, S.S., WEIR, R.P., DONALDSON, J.F., & KNIGHT, A.I. 2005. A new species of *Hypolycaena* C. & R. Felder (Lepidoptera: Lycaenidae) from Australia and its relationship with *H. phorbas* (Fabricius). *Australian Entomologist* **32** (1): 17-35. [*H. litoralis*; *Oecophylla smaragdina*]

LAFRANCHIS, T. & KAN, P. 2012. Relations entre fourmis et plusieurs lycenes en France. *Oreina* **19**: 6-13. Lycaenidae: Associations, Formicidae (Hymenoptera), Myrmecophily, review, larva, Ecology, Ecological relationships, Hymenopteran associates, France, biology, distribution.

LANE, D.A., & MEYER, C.E. 1999. Notes on the distribution and biology of *Hypochrysops cyane* (Waterhouse & Lyell) in northern Queensland. *Victorian Entomologist* **29** (5): 91. [*Iridomyrmex itinerans* group]

LARSEN, T.B., & PITTAWAY, A.R. 1982. Notes on the ecology, biology and taxonomy of *Apharitis acamas* (Klug) (Lepidoptera: Lycaenidae). *Entomologist's Gazette* **33** (3-4): 163-168. [*Apharitis buchanani*; *Crematogaster*; Oman; Afrotropical]

LEIMAR, O., & AXEN, A.H. 1993. Strategic behaviour in an interspecific mutualism: interactions between lycaenid larvae and ants. *Animal Behaviour* **46** (6): 1177-1182. [*Polyommatus icarus*; *Lasius*; *Tetramorium*]

LIEBIG, W.H. 1989. Bemerkungen zur Biologie von *Maculinea alcon* Schiff. (Lep., Lycaenidae). *Entomologische Nachrichten und Berichte* **33** (3): 117-118, 119-121. [*Myrmica rubra*; *Myrmica scabrinodis*]

LOHMAN, D.J., LIAO, Q., & PIERCE, N.E. 2006. Convergence of chemical mimicry in a guild of aphid predators. *Ecological Entomology* **31** (1): 41-51.

LOHMAN, D.J. & SAMARITA, V.U. 2009. The biology of carnivorous butterfly larvae (Lepidoptera: Lycaenidae: Miletinae: Miletini) and their ant-tended hemipteran prey in Thailand and the Philippines. *Journal of Natural History* **43** (9-10): 569-581.

LU, S.S., & SAMWAYS, M.J. 2001. Life history of the threatened Karkloof blue butterfly, *Orachrysops ariadne* (Lepidoptera: Lycaenidae). *African Entomology* **9** (2): 137-151. [Afrotropical]

MARTIN, J., & GURREA, P. 1983. Relationship between *Nordmannia esculi* Huebner (Lep.: Lycaenidae) and *Camponotus cruentatus* Latreille (Hym.: Formicidae). *Entomologist's Record and Journal of Variation* **95** (7-8): 153-154. [Spain]

MASCHWITZ, U., SCHROTH, M., HANEL, H., & PONG, T.Y. 1984. Lycaenids parasitizing symbiotic plant-ant partnerships. *Oecologia (Berlin)* **64** (1): 78-80. [*Arhopala amphimuta*; *Arhopala moolaiana*; *Arhopala zylda*; *Crematogaster*; Malaysia]

MATHEW, J., TRAVASSOS, M.A., CANFIELD, M.R., MURAWSKI, D.A., KITCHING, R.L. & PIERCE, N.E. 2008. The singing reaper: Diet, morphology and vibrational signaling in the Nearctic species *Feniseca tarquinius* (Lepidoptera: Lycaenidae, Miletinae). *Tropical Lepidoptera Research* **18** (1): 24-29.

MCGLONE, G. 1979. The large blue. *Gloucester Trust for Nature Conservation Newsletter* 1979 (Winter): 1p. [*Maculinea arion*; *Myrmica sabuleti*; United Kingdom]

MEGA, N.O. & DE ARAUJO, A.M. 2008. Do caterpillars of *Dryas julia alcionea* (Lepidoptera, Nymphalidae) show evidence of adaptive behaviour to avoid predation by ants? *Journal of Natural History* **42** (1-4): 129-137.

MEGENS, H.J., DE JONG, R. & FIEDLER, K. 2005. Phylogenetic patterns in larval host plant and ant association of Indo-Australian Arhopalini butterflies (Lycaenidae: Theclinae). *Biological Journal of the Linnean Society* **84** (2): 225-241. [*Arhopala* spp.]

MENDEL, H., & PARSONS, E. 1987. Observations on the life-history of the silver-studded blue *Plebejus argus* L. *Suffolh Natural History* **23**: 2-8. [*Lasius*; England]

MENSING, V. 1994. [A close study of a blue butterfly.] *Amoeba* **68** (1): 30-31. [*Maculinea alcon*]

MERKEL-WALLNER, G. 1996. Zu Vorkommen und Lebensraumsanspruchen von *Maculinea teleius* und *Maculinea nausithous* im ostlichen Landkreis Cham. *Acta Albertina Ratisbonensia* **50** (1): 75-88. [*Myrmica*]

MEULENGRACHT-MADSEN, J. 1993. [Ants or not]. *Lepidoptera (Copenhagen)* **6** (6): 161-167. [*Quercusia querqus*

MEYER-HOZAK, C. 2000. Population biology of *Maculinea rebeli* (Lepidoptera: Lycaenidae) on the chalk grasslands of eastern Westphalia (Germany) and implications for conservation. *Journal of Insect Conservation* **4** (2): 63-72.

MOORE, M. 1999. Some field notes on the as yet unnamed *Ogyris* species (formerly included in the species *Ogyris idmo halmaturia*) from Waikerie. *Victorian Entomologist* **29** (1): 12-18. [*Camponotus terebrans*]

MOUQUET, N., BELROSE, V., THOMAS, J.A., ELMES, G.W., CLARKE, R.T., & HOCHBERG, M.E. 2005. Conserving community modules: a case study of the endangered lycaenid butterfly *Maculinea alcon*. *Ecology (Washington, D.C.)* **86** (12): 3160-3173.

MOUQUET, N., THOMAS, J.A., ELMES, G.W., CLARKE, R.T., & HOCHBERG, M.E. 2005. Population dynamics and conservation of a specialized predator: a case study of *Maculinea arion*. *Ecological Monographs* **75** (4): 525-542.

MURATA, K., & NOHARA, K. 2005. The interspecific relations among insects and spiders in the habitat of *Shijimiaeoides divinus asonis* (Matsumura) in Aso area. *Japanese Journal of Entomology New Series* **8** (3): 79-90.

MUSCHE, M., ANTON, C., WORGAN, A., & SETTELE, J. 2006. No experimental evidence for host ant related oviposition in a parasitic butterfly. *Journal of Insect Behavior* **19** (5): 631-643. [*Maculinea nausithous*; *Myrmica rubra*]

NAGAYAMA, F. 1950a. Symbiosis of *Niphanda fusca* larvae (Lycaenidae) with *Camponotis* ants. [In Japanese]. *Shin Konchu* **3** (5): 18-21.

NAGAYAMA, F. 1950b. Life-history of *Niphanda fusca* Bremer et Grey (Lycaenidae). [In Japanese; English summary]. *Insect Ecology* **3**: 3-18.

NAIR, V.P. 2003. Myrmecophily in the common pierrot, *Castalius rosimon* Fabricius (Lepidoptera: Lycaenidae). *Zoos' Print Journal* **18** (1): 994.

NASH, D.R., ALS, T.D. & BOOMSMA, J.J. 2011. Survival and growth of parasitic *Maculinea alcon* caterpillars (Lepidoptera, Lycaenidae) in laboratory nests of three *Myrmica* ant species. *Insectes Sociaux* **58** (3): 391-401.

Abstract: The Alcon blue butterfly (*Maculinea alcon*) parasitizes the nests of several *Myrmica* ant species. In Denmark, it uses *M. rubra* and *M. ruginodis*, but never *M. scabrinodis*. To further examine the basis of this specificity and local co-adaptation between host and parasite, the pattern of growth and survival of newly-adopted caterpillars of *M. alcon* in *Myrmica* subcolonies was examined in the laboratory. *M. alcon* caterpillars were collected from three populations differing in their host use, and reared in laboratory nests of all three ant species collected from each *M. alcon* population. While there were differences in the pattern of growth of caterpillars from different populations during the first few months after adoption, which depended on host ant species and the site from which the ants were collected, there was no evidence of major differences in final size achieved. Survival was, however, much higher in nests of *M. rubra* than in nests of *M. ruginodis* and *M. scabrinodis*, even for caterpillars from a population that is never known to use *M. rubra* as a host in the field. The caterpillars of *M. alcon* thus do not show local adaptation in their pattern of growth and survival, but instead show a pattern that may reflect different nestmate recognition abilities of the host ants, related to their sociogenetic organisation. The pattern of observed host ant use in the field seems to result from a combination of differences in local host availability and locally adapted infectivity, modulated by smaller differences in survivorship in the nests of the different host ants.

NASH, D.R., ALS, T.D., MAILE, R., JONES, G.R. & BOOMSMA, J.J. 2008. A mosaic of chemical coevolution in a large blue butterfly. *Science (Washington DC)* **319** (5859): 88-90. [*Maculinea alcon, Myrmica rubra, Mrymica ruginodis*]

NEW, T.R., & BRITTON, D.R. 1997. Refining a conservation plan for an endangered lycaednid [lycaenid] butterfly, *Acrodipsas myrmecophila*, in Victoria, Australia. *Journal of Insect Conservation* **1** (2): 65-72. [*Papyrius*]

NIELSEN, O.F. 1999. Myrmecofili hos de aegte blaufugle i Danmark. *Lepidoptera (Copenhagen)* **7** (7): 208-223. [Polyommatini]

NOMURA, K., HIRUKAWA, N., YAMAOKA, R., & IMAFUKU, M. 1992. Problems on the symbiosis between the lycaenid butterfly larva, *Niphanda fusca shijimia* and the ant *Camponotus* (*Camponotus*) *japonicus* (1). *Tyo To Ga* **1043** (2): 138-143. [Japan]

NORMAN, T. 1949. Note on the larva of *Amblypodia centaurus*. *Journal of the Bombay Natural History Society* **48**: 814. [When larva is isolated from ants death due to fungal infection of DNO occurs]

NOWICKI, P., MARCZYK, J. & KAJZER-BONK, J. 2015. Metapopulations of endangered *Maculinea* butterflies are resilient to large-scale fire. *Ecohydrology* **8** (3): 398-405.

NOWICKI, P., WITEK, M., SKORKA, P., & WOYCIECHOWSKI, M. 2005. Oviposition patterns in the myrmecophilous butterfly *Maculinea alcon* Denis & Schiffermuller (Lepidoptera: Lycaenidae) in relation to characteristics of foodplants and presence of ant hosts. *Polish Journal of Ecology* **53** (3): 409-417.

OGATA, Y. 1988. Observation on the ecology of *Coreana raphaelis* (Lycaenidae) – larval association with ants. *Insectarium* **25** (8): 248-253. [*Formica yessensis*; Japan]

OKUBO, T., YAGO, M. & ITIOKA, T. 2009. Immature stages and biology of Bornean *Arhopala* butterflies (Lepidoptera, Lycaenidae) feeding on myrmecophytic *Macaranga*. *Transactions of the Lepidopterological Society of Japan* **60** (1): 37-51.

OLIVE, J. 1978. Notes on the life history of *Jalmenus clementi* Druce (Lepidoptera: Lycaenidae). *Australian Entomological Magazine* **4** (6): 115-116. [*Iridomyrmex*; Australia]

OLIVER, J.C. & STEIN, L.R. 2011. Evolution of influence: signaling in a lycaenid-ant interaction. *Evolutionary Ecology* **25** (6): 1205-1216.

Abstract: Some phytophagous insects gain defense from natural enemies by associating with otherwise potentially harmful top predators. Many lycaenid butterfly caterpillars are involved in such interactions with ants: larvae provide carbohydrate rewards from the dorsal nectary organ (DNO) to associated ants in return for protection from natural enemies. The stability of these interactions involves signals that identify the lycaenid caterpillar as a mutualist. However, larvae of some lycaenid species, such as *Lycaena xanthoides*, are found in close association with ants but do not possess the reward producing DNO. Evaluating the relationship in a phylogenetic framework, we show that the association between *L. xanthoides* and ants likely evolved from a non-ant-associated ancestor. Behavioral trials also show that *L. xanthoides* larvae are capable of influencing ant behavior to increase ant tending when faced with a simulated predator attack, without providing DNO-derived rewards to ant associates. These results demonstrate that the DNO is not necessary to maintain associations between lycaenid larvae and ants. Third-party interactions may affect the evolution of mutualisms and consideration of underlying evolutionary history is necessary to understand contemporary species associations.

OMURA, H., WATANABE, M. & HONDA, K. 2009. Cuticular hydrocarbons of larva and pupa of Reverdin's blue *Lycaeides aryrognomon* (Lycaenidae) and its tending ants. *Transactions of the Lepidopterological Society of Japan* **60** (3): 203-210. [Japan]

OMURA, H., WATANABE, M. & HONDA, K. 2012. Cuticular hydrocarbon profiles of *Lycaeides subsolanus* larvae and their attendant ants. *Lepidoptera Science* **63**(4): 186-190.

Abstract: In their late instar stages (third or fourth), *Lycaeides subsolanus* larvae have a facultative symbiotic relationship with several ant species. In Yamanashi Prefecture, the larvae are tended frequently by worker ants of *Lasius japonicus* and sometimes by those of *Formica japonica*. Cuticular hydrocarbons (CHCs) were extracted from wild-caught late-instar larvae of *L. subsolanus* and the workers of these 2 attendant ant species, and their compositions were determined by gas-chromatography mass-spectrometry (GC MS). The attendant ants showed species-specific CHC compositions; the major compounds obtained from *L. japonicus* were determined to be branched alkanes with >29 carbon atoms, while those from *F. japonica* were determined to be linear alkanes and alkenes with 27 or 29 carbon atoms. The CHC profiles of the third- and fourth-instar larvae were qualitatively similar to each other but remarkably different from those of the attendant ants. The extracts obtained from *L. subsolanus* larvae contained 11 linear and 4 branched alkanes, the major compounds being nonacosane, pentacosane, heptacosane, and hentriacontane. The CHC profile of *L. subsolanus* larvae was quite similar to that of the larvae of *L. argyrognomon*, a closely related species. Our previous studies have shown that the CHC profiles of *L. argyrognomon* larvae were qualitatively consistent irrespective of the larval instar and the attendant ant species. These results indicate that both *L. subsolanus* and *L. argyrognomon* larvae can maintain symbiotic relationships with ants without changing their intrinsic CHC profile.

OSBORN, F., & JAFFE, K. 1997. Cooperation vs. exploitation: interactions between lycaenid (Lepidoptera: Lycaenidae) larvae and ants. *Journal of Research on the Lepidoptera* **34** (1-4): 69-82. [Review]

PATRICELLI, D., BARBERO, F., LA MORGIA, V., CASACCI, L.P., WITEK, M., BALLETTO, E. & BONELLI, S. 2011. To lay or not to lay: oviposition of *Maculinea arion* in relation to *Myrmica* ant presence and host plant phenology. *Animal Behaviour* **82** (4): 791-799.

Abstract: The choices made by ovipositing female butterflies play a key role in the survival of their offspring and consequently in the persistence of butterfly populations. These choices are even more crucial in the case of obligate myrmecophilous organisms such as *Maculinea* butterflies with larvae that, after a phytophagous period, need to be adopted by *Myrmica* ants to complete their life cycle. Because the worker ants' foraging range is limited, selecting an 'ideal' oviposition site requires that both the phenological stage of the larval food plant (short-term larval fitness) and the presence of suitable host ants (long-term larval fitness) are taken into account. Whether the female's selection of a valuable oviposition plant is influenced by the closeness of a *Myrmica* nest is unclear. We studied the oviposition

behaviour of a *Maculinea arion* population exploiting *Origanum vulgare* as a host plant. By following females, we collected phenological data on the visited plants that were either 'chosen' for oviposition or 'avoided' (flowers were visited and evaluated, but received no eggs), and we assessed the presence of *Myrmica* ants in the vicinity of each plant. Results suggest that plants are selected by *M. arion* females on the basis of their bud phenology and the presence of host ants and not of other environmental features. We thus hypothesize the evolution of an adaptive mechanism that affords females of this strictly myrmecophilous butterfly the ability to ensure the long-term survival of their brood by selecting host plants growing near a *Myrmica* nest.

PATRICELLI, D., BARBERO, F., OCCHIPINTI, A., BERTEA, C.M., BONELLI, S., CASACCI, L.P., ZEBELO, S.A., CROCOLL, C., GERSHENZON, J. MAFFEI, M.E. *ET AL* 2015. Plant defences against ants provide a pathway to social parasitism in butterflies. *Proceedings of the Royal Society B-Biological Sciences* **282** (1811): Article Number 20151111.

PATRICELLI, D., WITEK, M., BARBERO, F., CASACCI, L.P., BONELLI, S. & BALLETTO, E. 2010. Evidence of high larval host ant (Hymenoptera: Formicidae) specificity in the first post-adoption phase for the myrmecophilous butterfly *Phengarus* (*Maculinea*) *nausithous* (Lepidoptera: Lycaenidae). *Sociobiology* **55** (3): 861-869.

PAULER, R., KAULE, G., VERHAAGH, M., & SETTELE, J. 1995. Untersuchungen zur Autokologie des Schwarzgefleckten Ameisenblaulings, *Maculinea arion* (Linnaeus, 1758) (Lepidoptera: Lycaenidae), in Sudwestdeutschland. *Nachrichten des Entomologischen Vereins Apollo* **16** (2-3): 147-186.

PECH, P., FRIC, Z. & KONVICKA, M. 2007. Species-specificity of the *Phengaris* (*Maculinea*) – *Myrmica* host system: fact or myth? (Lepidoptera: Lycaenidae; Hymenoptera: Formicidae). *Sociobiology* **50** (3): 983-1003.

PECH, P., FRIC, Z., KONVICKA, M., & ZRZAVY, J. 2004. Phylogeny of *Maculinea* blues (Lepidoptera: Lycaenidae) based on morphological and ecological characters: evolution of parasitic myrmecophily. *Cladistics* **20** (4): 362-375. [GOT]

PECSENYE, K., BERECZKI, J., JUHASZ, E., TARTALLY, A. & VARGA, Z. 2015. Contrasting genetic structure in cuckoo and predatory *Maculinea* butterflies. *Conservation Genetics* **16** (4): 939-954.

***PELLISSIER, L., LITSIOS, G., FIEDLER, K., POTTIER, J., DUBIUS, A., PRADERVAND, J.-N., SALAMIN, N. & GUISAN, A. 2012.** Loss of interactions with ants under cold climate in a regional myrmecophilous butterfly fauna. *Journal of Biogeography* **39** (10): 1782-1790.

Abstract: Aim: Specialized mutualistic clades may revert and thus increase their autonomy and generalist characteristics. However, our understanding of the drivers that trigger reductions in mutualistic traits and of the consequences for the tolerance of these species to various environmental conditions remains limited. This study investigates the relationship between the environmental niche and the degree of myrmecophily (i.e. the ability to interact with ants) among members of the Lycaenidae. Location: The western Swiss Alps. Methods: We measured the tolerance of Lycaenidae species to low temperatures by comparing observations from a random stratified field sampling with climatic maps. We then compared the species-specific degree of myrmecophily with the species range limits at colder temperatures while controlling for phylogenetic dependence. We further evaluated whether the community-averaged degree of myrmecophily increases with temperature, as would be expected in the case of environmental filters acting on myrmecophilous species. Results: Twenty-nine Lycaenidae species were found during sampling. Ancestral state reconstruction indicated that the 24 species of Polyommatinae displayed both strong myrmecophily and secondary loss of mutualism; these species were used in the subsequent statistical analyses. Species with a higher degree of ant interaction were, on average, more likely to inhabit warmer sites. Species inhabiting the coldest environments displayed little or no interaction with ants. Main conclusions: Colder climates at high elevations filter out species with a high degree of myrmecophily and may have been the direct evolutionary force that promoted the loss of mutualism. A larger taxon sampling across the Holarctic may help to distinguish between the ecological and evolutionary effects of climate.

PELLISSIER, L., LITSIOS, G., GUISAN, A. & ALVAREZ, N. 2012. Molecular substitution rate increases in myrmecophilous lycaenid butterflies (Lepidoptera). *Zoologica Scripta* **41** (6): 651-658.

Abstract: Is species diversification driven by neutral- or niche-based processes? Butterflies of the Lycaenidae family have developed mutualistic interactions with ants. This biotic requirement increased the spatial fragmentation of populations of lower effective population size (Ne) compared with autonomous species. The nearly neutral theory predicts that species with smaller Ne should fix more mutations because of the increased strength of drift. Taking into account the phylogenetic relatedness among species, this study shows that species with a stronger dependence on ants displayed more intra-specific Single Nucleotide Polymorphisms compared with species with low or no myrmecophily. This phenomenon can cause more pronounced genetic differentiation between populations and could ultimately promote speciation in a similar manner as on physical islands. The large species diversity observed in this family could be the consequence of this neutral process enhancing the diversification of lineages.

PELLISSIER, L., RASMANN, S., LITSIOS, G., FIEDLER, K., DUBUIS, A., POTTIER, J. & GUISAN, A. 2012. High host-plant nitrogen content: a prerequisite for the evolution of ant-caterpillar mutualism? *Journal of Evolutionary Biology* **25** (8): 1658-1666.

Abstract: The amount of nitrogen required to complete an insects life cycle may vary greatly among species that have evolved distinct life history traits. Myrmecophilous caterpillars in the Lycaenidae family produce nitrogen-rich exudates from their dorsal glands to attract ants for protection, and this phenomenon has been postulated to shape the caterpillars host-plant choice. Accordingly, it was postulated that evolution towards myrmecophily in Lycaenidae is correlated with the utilization of nitrogen-rich host plants. Although our results were consistent with the evolutionary shifts towards high-nutrient host plants serving as exaptation for the evolution of myrmecophily in lycaenids, the selection of nitrogen-rich host plants was not confined to lycaenids. Butterfly species in the nonmyrmecophilous family Pieridae also preferred nitrogen-rich host plants. Thus, we conclude that nitrogen is an overall important component in the caterpillar diet, independent of the level of myrmecophily, as nitrogen can enhance the overall insect fitness and survival. However, when nitrogen can be obtained through alternative means, as in socially parasitic lycaenid species feeding on ant brood, the selective pressure for maintaining the use of nutrient-rich host plants is relaxed, enabling the colonization of nitrogen-poor host plants.

PENZ, C.M., & DE VRIES, P.J. 2006. Systematic position of *Apodemia paucipuncta* (Riodinidae), and a critical evaluation of the nymphidiine transtilla. *Zootaxa* **1190**: 1-50.

PETERSON, M.A. 1993. The nature of ant attendance and the survival of larval *Icaria acmon* (Lycaenidae). *Journal of the Lepidopterists' Society* **47** (1): 8-16. [*Formica*; *Tapinoma sessile*; Nearctic Region]

PETERSON, M.A. 1995. Unpredictability in the facultative association between larvae of *Euphilotes enoptes* (Lepidoptera: Lycaenidae) and ants. *Biological Journal of the Linnean Society* **55** (3): 209-223.

PFEIFER, M.A., HENLE, K. & SETTELE, J. 2007. Populations with explicit borders in space and time: concept, terminology, and estimation of characteristic parameters. *Acta Biotheoretica* **55** (4): 305-316. [*Maculinea nausithous*]

PFEUFFER, E. 1998. Zur Myrmekophilie des Idas-Blaulings (*Lycaeides idas* L.). Beobachtungen an den Dammen der Lechstaustufen im Unteren Lechtal. *Berichte des Naturwissenschaftlichen Vereins fuer Schwaben* **102**: 41-56. [*Formica*]

PIERCE, N.E. 1984. Amplified species diversity: a case study of an Australian lycaenid butterfly and its attendant ants. *Symposia of the Royal Entomological Society of London* No. 11: 197-200. [*Jalmenus evagoras*; *Iridomyrmex*; Australia]

PIERCE, N.E. 1985. Lycaenid butterflies and ants: selection for nitrogen-fixing and other protein-rich food plants. *American Naturalist* **125** (6): 888-898. [General reference]

PIERCE, N.E., 1987a. The remarkable life histories of lycaenid butterflies. *Insectarium* **24** (3): 76-83. [Review]

PIERCE, N.E. 1987b. The evolution and biogeography of associations between lycaenid butterflies and ants. *Oxford Surveys in Evolutionary Biology* **4**: 89-116. [General reference]

PIERCE, N.E., 1989. Butterfly-ant mutualisms. *In*: GRUBB, P.J., & WHITTAKER, J.B. [Eds]. *Toward a more exact ecology*. Blackwell Scientific Publications. Oxford & London: i-x, 1-468. Chapter pagination: 299-324. [*Jalmenus evagoras*; *Iridomyrmex anceps*; Australia]

PIERCE, N.E. 2001. Peeling the onion: symbioses between ants and blue butterflies. *In*: DUGATKIN, L.A. [Ed.]. *Model systems in behavioral ecology: integrating conceptual, theoretical, and empirical approaches*. Princeton University Press, Princeton & Oxford. i-xxii, 1-551. Chapter pagination: 41-56.

PIERCE, N.E. & BERRY, A. 2011. The herbivore's dilemma: never enough nitrogen. *In*: **LOSOS, J.B. [ED.] 2011.** *In the light of evolution: essays from the laboratory and field*. Roberts and Company, Greenwood Village: i-xi, 1-330. Chapter pagination: 121-133. [Lycaenidae and Formicidae mutualism]

PIERCE, N.E., BRABY, M.F., HEATH, A., LOHMAN, D.J., MATHEW, J., RAND, D.B., & TRAVASSOS, M.A. 2002. The ecology and evolution of ant association in the Lycaenidae (Lepidoptera). *Annual Review of Entomology* **47**: 733-771. [General reference]

PIERCE, N.E., & EASTEAL, S. 1986. The selctive advantage of attendant ants for the larvae of a lycaenid butterfly, *Glaucopsyche lygdamus*. *Journal of Animal Ecology* **55** (2): 451-462. [*Formica altipetens*; Colorado]

PIERCE, N.E., & ELGAR, M.A. 1985. The influence of ants on host plant selection by *Jalmenus evagoras*, a myrmecophilous lycaenid butterfly. *Behavioral Ecology and Sociobiology* **16** (3): 209-222. [*Iridomyrmex*; Queensland, Australia]

PIERCE, N.E., KITCHING, R.L., BUCKLEY, R.C., TAYLOR, M.F.J., & BENBOW, K.F. 1987. The costs and benefits of cooperation between the Australian lycaenid butterfly, *Jalmenus evagoras*, and its attendant ants. *Behavioral Ecology and Socibiology* **21** (4): 237-248. [*Iridomyrmex*]

PIERCE, N.E., & MEAD, P.S. 1981. Parasitoids as selective agents in the symbiosis between lycaenid butterfly larvae and ants. *Science (Washington DC)* **211** (No. 4487): 1185-1187. [*Glaucopsyche lygdamus*; *Formica fusca*; Colorado, USA]

PIERCE, N.E., NASHD.R., BAYLIS, M., & CARPER, E.R. 1991. Variation in the attractiveness of lycaenid butterfly larvae to ants. *In*: HUXLEY, C.R., & CUTLER, D.F. [Eds]. *Ant-plant interactions*. Oxford University Press. Oxford, New York & Tokyo. i-xvii, 1-601. Chapter pagination: 131-142. [*Jalmenus evagoras*; *Iridomyrmex*]

PIERCE, N.E. & YOUNG, W.R. 1986. Lycaenid butterflies and ants: two-species stable equilibria in mutualistic, commensal, and parasitic interactions. *American Naturalist* **128** (2): 216-227. [Mathematical model]

POMEROY, A.W.J. 1924. Observations on some the insects etc., on ant trees; and on lycaenid life-histories, at Ibadan, S. Nigeria. *Proceedings of the Entomological Society of London* **1924**: 73-79.

PONTIN, A.J. 1990a. *Plebejus argus* L. (Lep., Lycaenidae) pupae in nests of *Lasius niger* (L.) (Hym., Formicidae). *Entomologist's Monthly Magazine* **126**: 73.

PONTIN, A.J. 1990b. The low specificity of *Plejebus* [*Plebejus*] *argus* (L.) (Lep., Lycaenidae) to species of *Lasius* (Hym., Formicidae). *Entomologist's Monthly Magazine* **126** (Nos 1516-1519): 196.

PORTER, K., STEEL, C.A., & THOMAS, J.A. 1992. Butterflies and communities. *In*: DENNIS, R.L.H. [Ed.]. *The ecology of butterflies in Britain*. Oxford University Press. Oxford & New York: i-xi, 1-354. Chapter pagination: 139-177.

PRATT, G. 2008. Buckwheat blues: part 1. *American Butterflies* **16** (2): 4-32.

PULLIN, A.S. 1996. Restoration of butterfly populations in Britain. *Restoration Ecology* **4** (1): 71-80. [*Maculinea arion*; *Myrmica sabuleti*]

RAND, D.B., HEATH, A., SUDERMAN, T., & PIERCE, N.E. 2000. Phylogeny and life history evolution of the genus *Chrysoritis* within the Aphnaeini (Lepidoptera: Lycaenidae), inferred from mitochondrial cytochrome oxidase I sequences. *Molecular Phylogenetics and Evolution* **17** (1): 85-96. [Afrotropical]

RAVENSCROFT, N. [O.M.] 1987. Vanishing blues and frantic ants. *BBC Wildlife* **5** (9): 466-468. [*Plebejus argus*; England]

RAVENSCROFT, N. [O.M.] 1988. The conservation of the silver-studded blue butterfly in Suffolk. *News British Butterfly Conservation Society* No. 40: 18-20. [*Plebejus argus*; *Lasius alienus*; *Lasius flavus*; *Lasius niger*; England]

RAVENSCROFT, N.O.M. 1990. The ecology and conservation of the silver-studded blue butterfly *Plebejus argus* L. on the sandlings of East Anglia, England. *Biological Conservation* **53** (1): 21-36. [*Lasius*]

ROBBINS, R.K. 1991. Cost and evolution of a facultative mutualism between ants and lycaenid larvae (Lepidoptera). *Oikos* **62** (3): 363-369. [*Arawacus lincoides*; *Ectatomma*]

ROBBINS, R.K., & AIELLO, A. 1982. Foodplant and oviposition records for Panamanian Lycaenidae and Riodinidae. *Journal of the Lepidopterists' Society* **36** (2): 65-75. [*Audre domina*; *Ectatomma tuberculatum*; Panama]

RODRIGUES, D., KAMINSKI, L.A., FREITAS, A.V.L. & OLIVEIRA, P.S. 2010. Trade-offs underlying polyphagy in a facultative ant-tended florivorous butterfly: the role of host plant quality and enemy-free space. *Oecologia (Berlin)* **163** (3): 719-728. [*Parrhasius polibetes* (Lycaenidae); Brazil]

ROJO DE LA PAZ, A. 1992. Two new cases of myrmecophily in the Lycaenidae (Lepidoptera): biology of *Cigaritis zohra* (Donzel, 1847) and *Cigaritis allardi* (Oberthur, 1909) in Morocco. *Nota Lepidopterologica Supplement* **4**: 14-17. [*Crematogaster*]

ROJO DE LA PAZ, A. 1993. Myrmecophilie chez deux lepidopteres Lycaenidae au Maroc: *Cigaritis zohra* et *Cigaritis allardi*. *Actes des Colloques Insectes Sociaux* **8**: 151-160. [*Crematogaster*; Morocco]

ROJO DE LA PAZ, A. 2000. Specificite de la relation entre le papillon myrmecophile *Maculinea alcon* (Lepidoptera: Lycaenidae) et les fourmis du genre *Myrmica* (Hymenoptera: Formicidae) en Sarthe (France): resultats preliminaires. *Actes des Colloques Insectes Sociaux* **13**: 151-155.

ROSS, G.N. 1985. The case of the vanishing caterpillar. *Natural History* **94** (11): 48-55. [*Lemonias rossi*; *Camponotus abdominalis*]

ROY, P. 1984. *Mahatala ameria*. *Exotic Entomology Group Newsletter* 1984 (Spring): 15. [*Camponotus*; *Polyrhachis laevissima*; India]

RUSSELL, J.A., GOLDMAN-HUERTAS, B., MOREAU, C.S., BALDO, L., STAHLHUT, J.K., WERREN, J.H. & PIERCE, N.E. 2009. Specialization and geographic isolation among *Wolbachia* symbionts from ants and lycaenid butterflies. *Evolution* **63** (3): 624-640.

SAARINEN, E.V. 2005. Life history and myrmecophily of *Neomyrina nivea periculosa* (Lycaenidae: Theclinae). *Journal of the Lepidopterists' Society* **59** (2): 112-115.

SAARINEN, E.V. 2006. Differences in worker caste behaviour of *Oecophylla smaragdina* (Hymenoptera: Formicidae) in response to larvae of *Anthene emolus* (Lepidoptera: Lycaenidae). *Biological Journal of the Linnean Society* **88**: 391-395. [Have photocopy]

SAARINEN, E.V., & DANIELS, J.C. 2006. Miami blue butterfly larvae (Lepidoptera: Lycaenidae) and ants (Hymenoptera: Formicidae): new information on the symbionts of an endangered taxon. *Florida Entomologist* **89** (1): 69-74.

SAARINEN, P. 1995. Kalliosinisiiven (*Scolitantides orion*) ekologia ja esiintyminen Lohjalla vuosina 1991-92. *Baptria (Helsinki)* **20** (4): 195-198.

SAFIAN, S. & LARSEN, T.B. 2009. On the ecology and behavior of *Cerautola crowleyi* (Sharpe, 1890), *Cerautola ceraunia* (Hewitson, 1873) and *Cerautola miranda* (Staudinger, 1889) with descriptions of early stages (Lepidoptera: Lycaenidae, Epitolini). *Tropical Lepidoptera Research* **19** (1): 22-28. [Poritiinae]

SAMSON, P. [R.] 1987a. Green tree ants and associated lycaenid butterflies. *Entomological Society of Queensland News Bulletin* **14** (9): 137. [*Anthene seltuttus*; *Arhopala*; *Hypolycaena phorbas*; *Oecophylla smaragdina*; *Liphyra brassolis*; Australia]

SAMSON, P. [R.] 1987b. The blue connection: butterflies ants and mangroves. *Australian Natural History* **22** (4): 177-181. [Australia]

SAMSON, P.R. 1989. Morphology and biology of *Acrodipsas illidgei* (Waterhouse and Lyell), a myrmecophagous lycaenid (Lepidoptera: Lycaenidae: Theclinae). *Journal of the Australian Entomological Society* **28** (3): 161-168. [*Crematogaster*; Australia]

SAMSON, P.R., & O'BRIEN, C.F. 1981. Predation on *Ogyris genoveva* (Lepidoptera: Lycaenidae) by meat ants. *Australian Entomological Magazine* **8** (2-3): 21. [*Camponotus consobrinus*; *Iridomyrmex purpureus*; Australia]

SANETRA, M., & FIEDLER, K. 1996. Behaviour and morphology of an aphytophagous lycaenid caterpillar: *Cigaritis* (*Apharitis*) *acamas* Klug, 1834 (Lepidoptera: Lycaenidae). *Nota Lepidopterologica* **18** (1): 57-76. [*Crematogaster*; Cyprus]

SAVIGNANO, D.A. 1994. Benefits to Karner blue butterfly larvae from association with ants. ANDOW, D.A., BAKER, R.J., & LANE, C.P. [Eds]. *Karner blue butterfly: a symbol of a vanishing landscape*. Minnesota Agricultural Experimental Station. St. Paul: 1-222. Chapter pagination: 37-46. [*Lycaeides melissa samuelis*; *Formica*; *Polistes*]

SCHAEFER, M. 1992. *Brohmer-Fauna von Deutschland: ein Bestimmungsbuch umserer heimischen Tierwelt.* Quelle & Meyer, Heidelberg: 1-704.

SCHAEFER, M., BOHLKEN, H., REICHSTEIN, H., SATTLER, K., SCHMIDT, E., & SICK, F. 2000. *Brohmer. Fauna von Deutschland: ein Bestimmungsbuch unserer heimischen Tierwalt. 20., uberarbeitete Auflage*. Quelle & Meyer Verlag, Wiebelsheim. i-xiv, 1-791. [Distribution and keys to the insects of Germany; general work]

SCHEPER, M., VAN DER MADE, J., & WYNHOFF, I. 1995. *Maculinea alcon*: interactions between a myrmecophilous butterfly, its larval foodplant and its host ants. *Proceedings of the Section Experimental and Applied Entomology of the Netherlands Entomological Society* **6**: 77-78. [*Myrmica*]

SCHEPER, M., WYNHOFF, I., & VAN DER MADE, J. 1995. The Alcon large blue butterfly and the mangement of heathland. *Levende Natuur* **96** (3): 66-71. [*Maculinea alcon*; *Myrmica*]

SCHLICK-STEINER, B.C., STEINER, F.M., HOTTINGER, H., NIKIFOROV, A., MISTRIK, R., SCHAFELLNER, C., BAIER, P., & CHRISTIAN, E. 2004. A butterfly's chemical key to various ant forts: intersection odour or aggregate-odour multi-host mimicry? *Naturwissenschaften* **91**: 209-214. [*Maculinea rebeli*] [GOT]

SCHMIDT, D.J. 2002. Notes on ant-lycaenid associations (Hymenoptera: Formicidae and Lepidoptera: Lycaenidae) in southeast Queensland. *Australian Entomologist* **29** (2): 61-68.

SCHMIDT, D.J., & RICE, S.J. 2002. Association of ants with juvenile *Ogyris amaryllis amaryllis* Hewitson (Lepidoptera: Lycaenidae) in south-eastern Queensland. *Australian Journal of Entomology* **41** (2): 164-169.

SCHONROGGE, K., WARDLAW, J.C., PETERS, A.J., EVERETT, S., THOMAS, J.A., & ELMES, G.W. 2004. Changes in chemical signature and host specificity from larval retrieval to full social integration in the myrmecophilous butterfly *Maculinea rebeli*. *Journal of Chemical Ecology* **30** (1): 91-107.

SCHONROGGE, K., WARDLAW, J.C., THOMAS, J.A., & ELMES, G.W. 2000. Polymorphic growth rates in myrmecophilous insects. *Proceedings of the Royal Society of London Series B Biological Sciences* **267** (1445): 771-777. [*Maculinea* spp.]

SCHREMMER, F. 1978. Zur Bionomie und Morphologie der myrmeckophilen Raupe und Puppe der neotropischen Tagfalter-Art *Hamearis erostratus* (Lepidoptera: Riodinidae). *Entomologica Germanica* **4** (2): 113-121. [*Camponotus lindigi*; Colombia]

SCHROEDER, E. 2005. Unsichere Zeiten – Ameisen als Wirte von Blaeuulingen. *Unterricht Biologie* **29** (306): 23-27. [*Maculinea arion* and *Myrmica sabuleti*; population decreases and extinctions]

SCHROTH, M., & MASCHWITZ, U. 1984. Zur larvalbiologie und Wirtsfindung von *Maculinea teleius* (Lepidoptera: Lycaenidae), eines Parasiten von *Myrmica laevinodis* (Hymenoptera: Formicidae). *Entomologia Generalis* **9** (4): 225-230.

SCHURIAN, K.G. 1994. Beobachtungen zur Biologie und Okologie von *Zizeeria knysna* (Trimen 1862) (Lepidoptera: Lycaenidae). *Nachrichten des Entomologischen Vereins Apollo* **15** (1-2): 47-56. [*Pheidole*] [Afrotropical]

SCHURIAN, K.G. 1995. Die Biologie von *Polyommatus* (*Aricia*) *cramera* (Eschscholtz 1821) von den Kanarischen Inseln (Lepidoptera: Lycaenidae). *Nachrichten des Entomologischen Vereins Apollo* **16** (1): 63-74. [*Myrmica*; *Lasius*]

SCHURIAN, K.G., FIEDLER, K., & MASCHWITZ, U. 1993. Parasitoids exploit secretions of mymecophilous lycaenid butterfly caterpillars (Lycaenidae). *Journal of the Lepidopterists' Society* **47** (2): 150-154. [*Polyommatus*; *Plagiolepis pygmaea*]

SCHURIAN, K.G., TEN HAGEN, W., & ECKWEILER, W. 2005. Beitrag zur Biologie und Oekologie von *Polyommatus* (*Agrodiaetus*) *peilei* Bethune-Baker, 1921 (Lepidoptera: Lycaenidae). *Nachrichten des Entomologischen Vereins Apollo* **26** (4): 197-206.

SENDOYA, S.F., FREITAS, A.V.L. & OLIVEIRA, P.S. 2009. Egg-laying butterflies distinguish predacious ants by sight. *American Naturalist* **174** (1): 134-140.

SETTELE, J., BARBERO, F., MUSCHE, M., THOMAS, J.A. & SCHOENROGGE, K. 2011. Singing the blues: from experimental biology to conservation application. *Journal of Experimental Biology* **214** (9): 1407-1410. [*Maculinea, Myrmica*]

SEUFERT, P., & FIEDLER, K. 1996a. The influence of ants on patterns of colonization and establishment within a set of coexisting lycaenid butterflies in a south-east Asian tropical rain forest. *Oecologia (Berlin)* **106** (1): 127-136.

SEUFERT, P., & FIEDLER, K. 1996b. Life-history diversity and local co-existence of three closely related lycaenid butterflies (Lepidoptera: Lycaenidae) in Malaysian rainforests. *Zoologischer Anzeiger* **234** (4): 229-239. [*Cheritra freja*; *Drupadia ravindra*; *Drupadia theda*; *Crematogaster*]

SEUFERT, P., & FIEDLER, K. 1999. Myrmecophily and parasitoid infestation of South-east Asian lycaenid butterfly larvae. *Ecotropica* **5** (1): 59-64.

SEYMOUR, A.S., GUTIERREZ, D., & JORDANO, D. 2003. Dispersal of the lycaenid *Plebejus argus* in response to patches of its mutualist ant *Lasius niger*. *Oikos* **103** (1): 162-174.

SHIMIZU-KAYA, U., OKUBO, T. & ITIOLA, T. 2014. Exploitation of food bodies on *Macaranga* myrmecophytes by larvae of a lycaenid species, *Arhopala zylda* (Lycaeninae). *Journal of the Lepidopterists Society* **68** (1): 31-36.

SHIRAIWA, K. 2008. Effects of Argentine ants (*Linepithema humile*) on butterflies. *Butterflies* **50**: 50-53.

SIDHU, A.K. 2005. Myrmecophily in Indian butterflies (Lepidoptera: Lycaenidae). *Bionotes* **7** (2): 50-52.

SIDHU, A.K. 2006. Observations on the biology of spotted pierrot, *Tarucus callinara* Butler (Lepidoptera: Lycaenidae: Polyommatinae). *Journal of Environment and Sociobiology* **3** (2): 111-114.

SIDHU, A.K., ROSE, H.S., & SEHGAL, J. 2005. The life history of rusty pierrot, *Tarucus alteratus* Moore (Lycaenidae: Polyommatinae). *Journal of Entomological Research New Dehli* **29** (1): 71-74.

SIELEZNIEW, M., BYSTROWSKI, C., DEONIZIAK, K. & DAS COSTA, J.M. 2015. An unexpected record of *Myrmica schencki* EMERY, 1895 as a secondary host ant of the hygrophilous form of a small and isolated population of the Alcon Blue butterfly *Phengaris* (=*Maculinea*) *alcon* (DENIS et SCHIFFERMULLER, 1775) (Lepidoptera, Lycaenidae) in NE Poland. *Polish Journal of Entomology* **84** (1): 49-59.

SIELEZNIEW, M., & DZIEKANSKA, I. 2009. Butterfly-ant relationships: host ant specificity of *Phengaris rebeli* Hirschke (Lepidoptera: Lycaenidae) in Pieniny Mts (southern Poland). *Polish Journal of Ecology* **57** (2): 403-409.

SIELEZNIEW, M., DZIEKANSKA, I. & STANKIEWICZ-FIEDUREK, A.M. 2010. Multiple host-ant use by the predatory social parasite *Phengaris* [*Maculinea*] *arion* (Lepidoptera: Lycaenidae). *Journal of Insect Conservation* **14** (2): 141-149.

SIELEZNIEW, M., & STANKIEWICZ, A.M. 2002. First data on host-ant specificity of parasitic *Maculinea alcon* (Den. & Schiff.) (Lepidoptera: Lycaenidae) in Poland and eastern Europe. *Fragmenta Faunistica (Warsaw)* **45** (2): 123-130.

SIELEZNIEW, M., & STANKIEWICZ, A.M. 2004. Simultaneous exploitation of *Myrmica vandeli* and *M. scabrinodis* (Hymenoptera: Formicidae) colonies by the endangered myrmecophilous butterfly *Maculinea alcon* (Lepidoptera: Lycaenidae). *European Journal of Entomology* **101** (4): 693-696. [GOT]

SIELEZNIEW, M., & STANKIEWICZ, A.M. 2007. Differences in the development of the closely related myrmecophilous butterflies *Maculinea alcon* and *M. rebeli* (Lepidoptera: Lycaenidae). *European Journal of Entomology* **104** (3): 433-444. [GOT]

SIELEZNIEW, M., & STANKIEWICZ, A.M. 2008. *Myrmica sabuleti* (Hymenoptera: Formicidae) not necessary for the survival of the population of *Phengaris* (*Maculinea*) *arion* (Lepidoptera: Lycaenidae) in eastern Poland: Lower host-ant specificity or evidence for geographical variation of an endangered social parasite? *European Journal of Entomology* **105** (4): 637-641.

SIELEZNIEW, M., STANKIEWICZ, A.M., & BYSTROWSKI, C. 2003. First observation of one *Maculinea arion* pupa in a *Myrmica lobicornis* nest in Poland. *Nota Lepidopterologica* **25** (4): 249-250.

SIELEZNIEW, M., WLOSTOWSKI, M. & DZIEKANSKA, I. 2010. *Myrmica schencki* (Hymenoptera: Formicidae) as the primary host of *Phengaris* (*Maculinea*) *arion* (Lepidoptera: Lycaenidae) at Heathlands in eastern Poland. *Sociobiology* **55** (1 B): 95-106.

SMILEY, J.T., ATSATT, P.R., & PIERCE, N.E. 1988. Local distribution of the lycaenid butterfly, *Jalmenus evagoras* in response to host ants and plants. *Oecologia (Berlin)* **76** (3): 416-422. [*Iridomyrmex anceps*; Australia]

SMITH, E.M. 2002. The effects of season, host plant protection, and ant predators on the survival of *Eumaeus atala* (Lycaenidae) in re-establishments. *Journal of the Lepidopterists' Society* **56** (4): 272-276.

SOLAZZO, G., MORITZ, R.F.A. & SETTELE, J. 2013. Choice behaviour of *Myrmica rubra* workers between ant larvae and larvae of their *Phengaris* (*Maculinea*) *nausithous* nest parasites. *Insectes Sociaux* **60**(1): 57-64.

Abstract: Larvae of *Phengaris* (*Maculinea*) butterflies are adopted by *Myrmica* workers and are obligate myrmecophiles. Brood recognition by *Myrmica rubra* workers was tested for concolonial larvae (*M. rubra*) versus allocolonial larvae (*M. rubra* and *P. nausithous*) to assay the mimetic efficiency of *P. nausithous*. In addition, we tested *M. rubra* ant colonies from different populations with and without the presence of *Phengaris*, to test for potential local adaptation in adoption behaviour. We show that *M. rubra* can distinguish between nest-mate and foreign larvae as well as between *P. nausithous* and their own larvae. Workers from the allopatric population inspected and rejected more *P. nausithous* larvae than workers from the sympatric population. This might reflect a local host adaptation in which the social parasite more efficiently mimes its sympatric host ants than allopatric ones.

SOLAZZO, G., MORITZ, R.F.A. & SETTELE, J. 2013. The social parasite *Phengaris* (*Maculinea*) *nausithous* affects genetic diversity within *Myrmica rubra* host ant colonies. *Journal of Insect Conservation* **18** (1): 69-75.

SOLAZZO, G., MORITZ, R.F.A. & SETTELE, J. 2014. The social parasite *Phengaris* (*Maculinea*) *nausithous* affects genetic diversity within *Myrmica rubra* host ant colonies. *Journal of Insect Conservation* **18** (1): 69-75.

SOLAZZO, G., SEIDELMANN, K., MORITZ, R.F.A. & SETTELE, J. 2015. Tetracosane on the cuticle of the parasitic butterfly *Phengaris* (*Maculinea*) *nausithous* triggers the first contact in the adoption process by *Myrmica rubra* foragers. *Physical Entomology* **40** (1): 10-17.

SOURAKOV, A., & EMMEL, T.C. 1997. Notes on life histories of *Oboronia liberiana* and *Oboronia ornata* (Lepidoptera: Lycaenidae). *Tropical Lepidoptera* **8** (Supplement 3): 29-31. [Afrotropical]

SPOMER, S.M., & HOBACK, W.W. 1998. New ant associations for *Glaucopsyche lygdamus* Doubleday (Lycaenidae). *Journal of the Lepidopterists' Society* **52** (2): 216-217.

STADLER, B., FIEDLER, K., KAWECKI, T.J., & WEISSER, W.W. 2001. Costs and benefits for phytophagous myrmecophiles: when ants are not always available. *Oikos* **92** (3): 467-478. [General reference; review]

STADLER, B., KINDLMANN, P., SMILAUER, P., & FIEDLER, K. 2003. A comparative analysis of morphological and ecological characters of European aphids and lycaenids in relation to ant attendance. *Oecologia (Berlin)* **135** (3): 422-430.

STANKIEWICZ, A., & SIELEZNIEW, M. 2002. Host specificity of *Maculinea telius* Bgstr. and *M. nausithous* Bgstr. (Lepidoptera: Lycaenidae) the new insight. *Annales Zoologici (Warsaw)* **52** (3): 403-408.

STANKIEWICZ, A.M., SIELEZNIEW, M., & BARANSKI, M. 2005. The first record of *Myrmica rugulosa* Nylander, 1849 (Hymenoptera: Formicidae) as a host-ant of *Maculinea rebeli* Hirschke, 1904 (Lepidoptera: Lycaenidae). *Polskie Pismo Entomologiczne* **74** (2): 99-103.

STANKIEWICZ, A.M., SIELEZNIEW, M., & SVITRA, G. 2005. *Myrmica schencki* (Hymenoptera: Formicidae) rears *Maculinea rebeli* (Lepidoptera: Lycaenidae) in Lithuania: new evidence for geographical variation of host-ant specificity of an endangered butterfly. *Myrmecologische Nachrichten* **7**: 51-54.

STEINER, F.M., SIELEZNIEW, M., SCHLICK-STEINER, B.C., HOETTINGER, H., STANKIEWICZ, A., & GORNICKI, A. 2003. Host specificity revisited: New data on *Mrymica* host ants of the lycaenid butterfly *Maculinea rebeli*. *Journal of Insect Conservation* **7** (1): 1-6.

ST LEGER-MOSS, J.T. 1989. Observations of *Hypolycaena phorbas phorbas* (Fabricius) (Lepidoptera: Lycaenidae) on Carlisle Island, Queensland. *Australian Entomological Magazine* **16** (4): 85-86. [*Oecophylla smaragdina*]

STOECKEL, S., & MERCIER, J.L. 2001. *Maculinea alcon* (Lepidoptera, Lycaenidae) en Brenne: analyse des relations entre la plante hote *Gentiana pneumonanthe* et la fourmi holte *Myrmica scabrinodis* (Hymenoptera, Formicidae). *Symbioses* **4**: 11-17.

STUDENSKA, A. 1988. [Myrmecophilous butterflies] [in Polish]. *Wszechswiat* **89** (4): 100-101. [*Myrmica*; Poland]

SWENGEL, A.B. 1995. Observations of spring larvae of *Lycaeides melissa samuelis* (Lepidoptera: Lycaenidae) in central Wisconsin. *Great Lakes Entomologist* **28** (2): 155-170.

TARTALLY, A. 2004a. Is *Manica rubida* (Hymenoptera: Formicidae) a potential host of the *Maculinea alcon* (Lepidoptera: Lycaenidae) group? *Myrmecologische Nachrichten* **6**: 23-27.

TARTALLY, A. 2004b. Accelerated development of *Maculinea rebeli* larvae under artificial conditions (Lycaenidae). *Nota Lepidopterologica* **27** (4): 303-308.

TARTALLY, A. 2005. *Myrmica salina* (Hymenoptera: Formicidae) as a host of *Maculinea alcon* (Lepidoptera: Lycaenidae). *Sociobiology* **46** (1): 39-43.

TARTALLY, A. 2009. A *Maculinea* boglarkalepkek Karpat-medencebol ismert hangyagazdai, parazitoidjai es a hangyagazdak egyeb szocialparazitai. *Termeszetvedelmi Kozlemenyek* 2009: 23-34.

Abstract: Larvae of *Maculinea* butterflies are obligate social parasites of *Myrmica* ant nests. The various butterfly populations often have different host ant species. A review is given about the known host ant usage of the *Maculinea* populations in the Carpathian Basin and about the other rare (e.g. ichneumon) species found with these butterflies and their host ants. Practical conservational suggestions are also given.

TARTALLY, A., NASH, D.R., LENGYEL, S. & VARGA, Z. 2008. Patterns of host ant use by sympatric populations of *Maculinea alcon* and *M. rebeli* in the Carpathian Basin. *Insectes Sociaux* **55** (4): 370-381.

TARTALLY, A., RAKOSY, L., VIZAUER, T.-C., GOIA, M. & VARGA, Z. 2008. *Maculinea nausithous* exploits *Myrmica scabrinodis* in Transylvania: unusual host ant species of a mymecophilous butterfly in an isolated region (Lepidoptera: Lycaenidae; Hymenoptera: Formicidae). *Sociobiology* **51** (2): 373-380.

TARTALLY, A., RODRIGUES, M.C., BRAKELS, P. & ARNALDO, P.S. 2013. *Myrmica aloba* (Hymenoptera: Formicidae) hosts isolated populations of a hoverfly, a butterfly and an ichneumon species in NE-Portugal. *Journal of Insect Conservation* **17** (4): 851-855.

Abstract: Larvae and pupae of the obligately myrmecophilous social parasites *Microdon myrmicae* (Diptera: Syrphidae) and *Maculinea alcon* (Lepidoptera: Lycaenidae) were found using exclusively *Myrmica aloba* (Hymenoptera: Formicidae) host ants in NE-Portugal. *Ichneumon eumerus* (Hymenoptera: Ichneumonidae) was also found developing in *Ma. alcon* pupae in nests of *My. aloba* at the same site. These are the first records of *Mi. myrmicae* and *I. eumerus* for Portugal, and from *My. aloba* nests. Earlier records that *My. aloba* is the only known host ant of *Ma. alcon* in Portugal are confirmed. Further studies on the biology of these isolated peripheral populations are necessary for their well-planned protection.

TARTALLY, A., & VARGA, Z. 2005. *Myrmica rubra* (Hymenoptera: Formicidae): the first data on host-ant specificity of *Maculinea nausithous* (Lepidoptera: Lycaenidae) in Hungary. *Myrmecologische Nachrichten* **7**: 55-59.

TARTALLY, A., & VARGA, Z. 2008. Host ant use of *Maculinea teleius* in the Carpathian Basin (Lepidoptera: Lycaenidae). *Acta Zoologica Academiae Scientiarum Hungaricae* **54** (3): 257-268.

TAUTZ, J., & FIEDLER, K. 1992. Mechanoreceptive properties of caterpillar hairs involved in mediation of butterfly-ant symbioses. *Naturwissenschaften* **79** (12): 561-563. [*Polyommatus icarus*; Formicidae]

TERBLANCHE, R.F., & VAN HAMBURG, H. 2004. The application of life history information to the conservation management of *Chrysoritis* butterflies (Lepidoptera: Lycaenidae) in South Africa. *Koedoe* **47** (1): 55-65. [Afrotropical]

THOMAS, C.D., GLEN, S.W.T., LEWIS, O.T., HILL, J.K., & BLAKELEY, D.S. 1999. Population differentiation and conservation of endemic races: the butterfly, *Plebejus argus*. *Animal Conservation* **2** (1): 15-21. [*Lasius*]

THOMAS, J.A. 1983. The ecology and conservation of *Lysandra bellargus* (Lepidoptera: Lycaenidae) in Britain. *Journal of Applied Ecology* **20** (1): 59-83. [*Myrmica sabuleti*; England]

THOMAS, J.A. 1984. The behaviour and habitat requirements of *Maculinea nausithous* (the dusky large blue butterfly) and *M. teleius* (the scarce large blue) in France. *Biological Conservation* **28**: 325-347. [GOT]

THOMAS, J.A. 1989a. The return of the large blue butterfly. *British Wildlife* **1** (1): 2-13. [*Maculinea arion*; England]

THOMAS, J.A. 1989b. The history, decline and re-establishment of the large blue butterfly in Devon. *Nature in Devon* No. 10: 34-44. [*Maculinea arion*; *Myrmica*; England]

THOMAS, J.A. 1990. The conservation of the silver-studded blue butterfly *Plebejus argus* on lowland heath. *In*: AULD, M.H.D., PICKESS, B.P., & BURGESS, N.D. [Eds]. *Proceedings of Heathlands Conference 2. History and management of southern lowland heaths: Harrow House, Dorset, 4-6 June 1990.* Royal Society for the Protection of Birds. Sandy. 1991: 1-97. Chapter pagination: 44-46. [*Lasius*]

THOMAS, J.A. 2002. Larval niche selection and evening exposure enhance adoption of a predacious social parasite, *Maculinea arion* (large blue butterfly), by *Myrmica* ants. *Oecologia (Berlin)* **132** (4): 531-537.

THOMAS, J.A., CLARKE, R.T., ELMES, G.W., & HOCHBERG, M.E. 1998. Population dynamics in the genus *Maculinea* (Lepidoptera: Lycaenidae). *In*: DEMPSTER, J.P., & MC LEAN, I.F.G. [Eds]. *Insect populations in theory and in practice: 19th symposium of the Royal Entomological Society*, 10-11 September, 1997 at the University of Newcastle. Kluwer Academic Publishers. Dordrecht, Boston & London: i-xx, 1-486. Chapter pagination: 261-290. [*Myrmica*]

THOMAS, J.A., & ELMES, G.W. 1993. Specialized searching and the hostile use of allomones by a parasitoid whose host, the butterfly *Maculinea rebeli* inhabits ant nests. *Animal Behaviour* **45** (3): 593-602. [*Myrmica schencki*]

THOMAS, J.A., & ELMES, G.W. 1998. Higher productivity at the cost of increased host-specificity when *Maculinea* butterfly larvae exploit ant colonies through trophallaxis rather than by predation. *Ecological Entomology* **23** (4): 457-464. [*Myrmica*]

THOMAS, J.A., & ELMES, G.W. 2001. Food-plant niche selection rather than the presence of ant nests explains oviposition patterns in the myrmecophilous butterfly genus *Maculinea*. *Proceedings of the Royal Society of London Series B Biological Sciences* **268** (1466): 471-477.

THOMAS, J.A., ELMES, G.W., CLARKE, R.T., KIM, K.G., MUNGUIRA, M.L., & HOCHBERG, M.E. 1998. Field evidence and model predictions of butterfly-mediated apparent competition between gentian plants and red ants. *Acta Oecologia* **18** (6): 671-684. [*Maculinea rebeli*; *Myrmica schencki*]

THOMAS, J.A., ELMES, G.W., SIELEZNIEW, M., SATANKIEWICZ-FIEDERUK, A., SIMCOX, D.J., SETTELE, J. & SCHOENROGGE, K. 2013. Mimetic host shifts in an endangered social parasite of ants. *Proceedings of the Royal Society Biological Sciences Series B* **280**(1751): 1-8.

Abstract: An emerging problem in conservation is whether listed morpho-species with broad distributions, yet specialized lifestyles, consist of more than one cryptic species or functionally distinct forms that have different ecological requirements. We describe extreme regional divergence within an iconic endangered butterfly, whose socially parasitic young stages use non-visual, non-tactile cues to infiltrate and supplant the brood in ant societies. Although indistinguishable morphologically or when using current mitochondrial and nuclear sequence-, or microsatellite data, *Maculinea rebeli* from Spain and southeast Poland exploit different *Myrmica* ant species and experience 100 per cent mortality with each other's hosts. This reflects major differences in the hydrocarbons synthesized from each region by the larvae, which so closely mimic the recognition profiles of their respective hosts that nurse ants afford each parasite a social status above that of their own kin larvae. The two host ants occupy separate niches within grassland; thus, conservation management must differ in each region. Similar cryptic differentiation may be common, yet equally hard to detect, among the approximately 10 000 unstudied morpho-species of social parasite that are estimated to exist, many of which are Red Data Book listed.

THOMAS, J.A., ELMES, G.W., & WARDLAW, J.C. 1993. Contest competition among *Maculinea rebeli* butterfly larvae in ant nests. *Ecological Entomology* **18** (1): 73-76. [*Myrmica*]

THOMAS, J.A., ELMES, G.W., & WARDLAW, J.C. 1998. Polymorphic growth in larvae of the butterfly *Maculinea rebeli*, a social parasite of *Myrmica* ant colonies. *Proceedings of the Royal Society of London Series B Biological Sciences* **265** (1408): 1895-1901.

THOMAS, J.A., ELMES, G.W., WARDLAW, J.C., & WOYCIECHOWSKI, M. 1989. Host specificity among *Maculinea* butterflies in *Myrmica* ant nests. *Oecologia* **79** (4): 452-457.

THOMAS, J.A., MUNGUIRA, M.L., MARTIN, J., & ELMES, G.W. 1991. Basal hatching by *Maculinea* butterfly eggs: a consequence of advanced myrmecophily? *Biological Journal of the Linnean Society* **44** (2): 175-184.

THOMAS, J.A., ROSE, R.J., CLARKE, R.T., THOMAS, C.D., & WEBB, N.R. 1999. Intraspecific variation in habitat availability among ectothermic animals near their climatic limits and their centres of range. *Functional Ecology* **13** (Supplement 1): 55-64. [*Plebejus argus*; *Myrmica sabuleti*]

THOMAS, J.A., SCHOENROGGE, K., BONELLI, S., BARBERO, F. & BALLETTO, E. 2010. Corruption of ant acoustical signals by mimetic social parasites *Maculinea* butterflies achieve elevated status in host societies by mimicking the acoustics of queen ants. *Communicative and Integrative Biology* **3** (2): 169-171.

THOMAS, J.A., SIMCOX, D.J. & CLARKE, R.T. 2009. Successful conservation of a threatened *Maculinea* butterfly. *Science (Washington D.C.)* **325** (5936): 80-83. [*Maculinea arion*]

THOMAS, J.A., SIMCOX, D.J., WARDLAW, J.C., ELMES, G.W., HOCHBERG, M.E., & CLARKE, R.T. 1998. Effects of latitude, altitude and climate on the habitat and conservation of the endangered butterfly *Maculinea arion* and its *Myrmica* host ants. *Journal of Insect Conservation* **2**: 39-46. [GOT]

THOMAS, J.A., WARDLAW, J.C. 1990. The effect of queen ants on the survival of *Maculinea arion* larvae in *Myrmica* ant nests. *Oecologia (Berlin)* **85** (1): 87-91.

THOMAS, J.A., & WARDLAW, J.C. 1992. The capacity of a *Myrmica* ant nest to support a predacious species of a *Maculinea* butterfly. *Oecologia (Berlin)* **91** (1): 101-109. [*Maculinea arion*; *Myrmic sabuleti*]

TOKESHI, M., YOKO-O, M., DAUD, J.R.P. & DOMITS, M. 2007. *Hypolycaena erylus* feeding on mangrove apple and attended by *Oecophylla* weaver ants, in north Sulawesi, Indonesia (Lepidoptera: Lycaenidae). *Tropical Lepidoptera* **17** (1-2): 35-36.

TOLMAN, T. 1994. The larval host plant of *Kretania eurypilus* (Freyer, 1852) in the Taygetos mountains of the Peloponessos, Greece (Lepidoptera: Lycaenidae). *Linneana Belgica* **14** (7): 363-366. [*Camponotus*]

TOLMAN, T. 1995a. Notes on the life-cycle of *Chilades trochylus* (Freyer, 1844) in Greece and a new host-plant family for European butterflies (Lepidoptera: Lycaenidae). *Linneana Belgica* **15** (1): 3-5. [Afrotropical; *Acantholepis*]

TOLMAN, T. 1995b. Concerning the biology and conservation of *Polyommatus* (*Agrodiaetus*) *iphigenia* (Herrich-Schaffer, (1847)) in Greece (Lepidoptera: Lycaenidae). *Phegea* **23** (2): 113-117. [*Lasius*]

TORIGOE, Y. 1992. Hibernation of *Spindasis takanonis* on the sandhills of Tottori. *Butterflies* **3**: 14-18.

TRAENKNER, A., & NUSS, M. 2005. Risk spreading in the voltinism of *Scolitantides orion orion* (Pallas, 1771) (Lycaenidae). *Nota Lepidopterologia* **28** (1): 55-64.

TRAGER, M.D. & DANIELS, J.C. 2009. Ant tending of Miami blue butterfly larvae (Lepidoptera: Lycaenidae): partner diversity and effects on larval performance. *Florida Entomologist* **92** (3): 474-482. [*Cyclargus thomasi bethunebakeri*]

TRAVASSOS, M.A., & PIERCE, N.E. 2000. Acoustics, context and function of vibrational signalling in a lycaenid butterfly-ant mutualism. *Animal Behaviour* **60** (1): 13-26. [*Jalmenus evagoras*; *Iridomyrmex anceps*]

TURNER, J.R., & HAWKESWOOD, T.J. 1992. Some notes on the general biology and adult emergence of *Ogyris genoveva genoveva* Hewitson (Lepidoptera: Lycaenidae). *Giornale Italiono di Entomologia* **6** (32): 161-168.

VALENTINE, P.S. 1984. Sound production in lycaenid larvae and pupae. *Victorian Entomologist* **14** (3): 22. [*Arhopala centaurus*; Australia]

VAN DER VEKEN, D. 1996. Gentiaanblauwtje (*Maculinea alcon*). *Wielewaal* **62** (5): 153-155.

VAN DYCK, H., OOSTERMEIJER, J.G.B., TALLOEN, W., FEENSTRA, V., VAN DER HIDDE, A., & WYNHOFF, I. 2000. Does the presence of ant nests matter for oviposition to a specialized myrmecophilous *Maculinea* butterfly. *Proceedings of the Royal Society of London Series B Biological Sciences* **267** (1446): 861-866.

VAN OEFFELT, P., & WYNHOFF, I. 1999. Meer ruimte voor zeldzame pimpernelblauwtjes. *Levende Natur* **100** (6): 220-221.

VELE, A., HOLUSA, J. & KLASNY, T. 2011. Food gathering efficiency of the common red ant (*Mrymica rubra*): Impact for butterflies of the genus *Phengaris*. *Sociobiology* **57** (2): 397-410.

VENKATESHA, M.G. 2005. Why is homopterophagous butterfly, *Spalgis epius* (Westwood) (Lepidoptera: Lycaenidae) amyrmecophilous? *Current Science Bangalore* **89** (2): 245-246.

VENKATESHA, M.G., SHASHIKUMAR, L., & GAYATHRI-DEVI, S.S. 2004. Protective devices of the carnivorous butterfly, *Spalgis epius* (Westwood) (Lepidoptera: Lycaenidae). *Current Science (Bangalore)* **87** (5): 571-572. [Amyrmecophily evolution]

VEROVNIK, R. 2002. [Myrmecophilous blue butterflies from the genus *Maculinea*. Localities of threatened ecological specialists in Slovenia.] *Proteus* **64** (5): 197, 212-219, 238.

VIBORG, A. 2002. Livsstrategier hos larver af Lycaenidae (Lepidoptera). *Entomologiske Meddelelser* **70** (1): 3-23.

VILA, R. & VIADER, S. 2008. Distribucio, ecologia i conservacio de *Iolana iolas* (Ochsenheimer, 1816) a Catalunya (Lepidoptera: Lycaenidae). *Buttleti de la Societat Catalana de Lepidopterologia* **99**: 97-114.

VOELKI, R., SCHIEFER, T., BRAEU, M., STETTMER, C., BINZENHOEFER, B. & SETTELE, J. 2008. Auswirkungen von Mahdtermin und –turnus auf Wiesenknopf-Ameisen-Blaeulinge: Ergebnisse mehrjaehriger Habitatanalysen fuer *Maculinea nausithous* und *M. teleius* in Bayern. *Naturschutz und Landschaftsplanung* **40** (5): 147-155.

WADA, A., ISOBE, Y., YAMAGUCHI, S., YAMAOKA, R., & OZAKI, M. 2001. Taste-enhancing effects of glycine on the sweetness of glucose: a gustatory aspect of symbiosis between the ant, *Camponotus japonicus*, and the larva of the lycaenid butterfly *Niphanda fusca*. *Chemical Senses* **26** (8): 983-992.

WAGNER, D. 1993. Species-specific effects of tending ants on the development of lycaenid butterfly larvae. *Oecologia (Berlin)* **96** (2): 276-281. [*Hemiargus isola*; *Dorymyrmex smithi*; *Forelius foetida*; *Formica perpilosa*]

WAGNER, D. 1995. Pupation site choice of a North American lycaenid butterfly: the benefits of entering ant nests. *Ecological Entomology* **20** (4): 384-392. [*Hemiargus isola*]

WAGNER, D., & KURINA, L. 1997. The influence of ants and water availability on oviposition behaviour and survivorship of a facultatively ant-tended herbivore. *Ecological Entomology* **22** (3): 352-360. [*Hemiargus isola*; *Formica*]

WAGNER, D., & MARTINEZ DEL RIO, C. 1997. Experimental tests of the mechanism for ant-enhanced growth in an ant-tended lycaenid butterfly. *Oecologia (Berlin)* **112** (3): 424-429. [*Hemiargus isola*; *Formica*]

WARDLAW, J.C. 1991. Techniques for rearing *Myrmica* ants (Hym.) and *Maculinea rebeli* Hir. Caterpillars (Lep., Lycaenidae). *Entomologist's Monthly Magazine* **27** (Nos 1528-1531): 233-241.

WARDLAW, J.C., ELMES, G.W., & THOMAS, J.A. 1998. Techniques for studying *Maculinea* butterflies: 1. Rearing *Maculinea* caterpillars with *Myrmica* ants in the laboratory. *Journal of Insect Conservation* **2**: 79-84. [GOT]

WARDLAW, J.C., ELMES, G.W., & THOMAS, J.A. 1998. Techniques for studying *Maculinea* butterflies: 2. Identification guide to *Myrmica* ants found on *Maculinea* sites in Europe. *Journal of Insect Conservation* **2** (2): 119-127.

WARDLAW, J.C., THOMAS, J.A., & ELMES, G.W. 2000. Do *Maculinea rebeli* caterpillars provide vestigial mutualistic benefits to ants when living as social parasites inside *Myrmica* ant nests? *Entomologia Experimentalis et Applicata* **95** (1): 97-103.

WATANABE, M. & HAGIWARA, Y. 2009. A newly observed form of symbiotic relationship between Reverdin's blue *Lycaeides argyrognomon praeterinsularis* (Verity), (Lycaenidae) and *Camponotus japonicus* Mayr (Formicidae). *Journal of Research on the Lepidoptera* **41**: 70-75.

WATANABE, M. & MIYASHITA, Y. 2006. *Vicia pseudo-orobus* as a new larval food plant of *Lycaenides subsolanus* (Lepidoptera, Lycaenidae). *Transactions of the Lepidopterological Society of Japan* **57** (2): 123-126.

WEBB, N.R., & THOMAS, J.A. 1994. Conserving insect habitats in heathland biotopes: a question of scale. *In*: EDWARDS, P.J., MAY, R.M., & WEBB, N.R. [Eds]. *Large scale ecology and conservation biology: 35th Symposium of the British Ecological Society with the Society for Conservation Biology*, University of Southampton. Blackwell Scientific Publications. Oxford & London. i-xi, 1-375. Chapter pagination: 129-151. [*Plebejus argus*; *Myrmica*]

WEBSTER, R.P., & NIELSEN, M.C. 1984. Myrmecophily in the Edward's hairstreak butterfly *Satyrium edwardsii* (Lycaenidae). *Journal of the Lepidopterists' Society* **38** (2): 124-133. [*Formica integra*; Michigan]

WEEKS, J.A. 2003. Parasitism and ant protection alter the survival of the lycaenid *Hemiargus isola*. *Ecological Entomology* **28** (2): 228-232.

WELLS, D. 2012. Butterfly-ant mutualism: *Lasius* ant-associates of silver-studded blue *Plebejus argus* in Norfolk, UK. *Norfolk and Norwich Naturalists Society Transactions* **45**(1): 13-20.

WILLIAMS, A.A.E., & TOMLINSON, A.G. 1994. Further distributional records and natural history notes on butterflies from Western Australia. *Victorian Entomologist* **24** (6): 122-124. [*Iridomyrmex*]

WILLIAMS, M.R., ATKINS, A.F., HAY, R.W., & BOLLAM, H.H. 1992. The life history of *Ogyris otanes* C. & R. Felder in the Stirling Range, Western Australia (Lepidoptera: Lycaenidae). *Australian Entomological Magazine* **19** (2): 55-60. [*Camponotus*]

WILSON, A. 1987. Flavonoid pigments in chalkhill blue (*Lysandra coridon* Poda) and other lycaenid butterflies. *Journal of Chemical Ecology* **13** (3): 473-493. [Formicidae]

WITEK, M., CASACCI, L.P., BARBERO, F., PATRICELLI, D., SALA, M., BOSSI, S., MAFFEI, M., WOYCIECHOWSKI, M., BALLETTO, E. & BONELLI, S. 2013. Interspecific relationships in co-occurring populations of social parasites and their host ants. *Biological Journal of the Linnean Society* **109** (3): 699-709.

Abstract: *Myrmica* ant colonies host numerous insect species, including the larvae of *Maculinea* butterflies and *Microdon myrmicae* hoverflies. Little is known about the interspecific relationships among these social parasites and their host ants occurring in sympatric populations. We investigated communities of social parasites to assess the strategies allowing them to share the same pool of resources (i.e. *Myrmica* colonies). The present study was carried out at five sites inhabited by different social parasite communities, each comprising varying proportions of *Maculinea teleius*, *Maculinea nausithous*, *Maculinea alcon*, and *Microdon myrmicae*. We investigated their spatial distributions, host segregation, the degree of chemical similarity between social parasites and hosts, and temporal overlaps in colony resource exploitation. Spatial segregation among social parasites was found in two populations and it arises from microhabitat preferences and biological interactions. Local conditions can drive selection on one social parasite to use a *Myrmica* host species that is not exploited by other social parasites. *Myrmica scabrinodis* and *Myrmica rubra* nests

infested by larvae of two social parasite species were found and the most common co-occurrence was between *Ma. teleius* and *Mi. myrmicae*. The successful coexistence of these two species derives from their exploitation of the host colony resources at different times of the year.

WITEK, M., SKORKA, P., SLIWINSKA, E.B., NOWICKI, P., MORON, D., SETTELE, J. & WOYCIECHOWSKI, M. 2011. Development of parasitic *Maculinea teleius* (Lepidoptera, Lycaenidae) larvae in laboratory nests of four *Myrmica* ant host species. *Insectes Sociaux* **58** (3): 403-411.

Abstract: *Maculinea* butterflies are social parasites of *Myrmica* ants. Methods to study the strength of host ant specificity in the *Maculinea-Myrmica* association include research on chemical and acoustic mimicry as well as experiments on ant adoption and rearing behaviour of *Maculinea* larvae. Here we present results of laboratory experiments on adoption, survival, development and integration of *M. teleius* larvae within the nests of different *Myrmica* host species, with the objective of quantifying the degree of specialization of this *Maculinea* species. In the laboratory, a total of 94 nests of four *Myrmica* species: *M. scabrinodis*, *M. rubra*, *M. ruginodis* and *M. rugulosa* were used. Nests of *M. rubra* and *M. rugulosa* adopted *M. teleius* larvae more readily and quickly than *M. ruginodis* colonies. No significant differences were found in the survival rates of *M. teleius* larvae reared by different ant species. Early larval growth of *M. teleius* larvae differed slightly among nests of four *Myrmica* host species. Larvae reared by colonies of *M. rugulosa* which were the heaviest at the beginning of larval development had the lowest mean larval body mass after 18 weeks compared to those reared by other *Myrmica* species. None of the *M. teleius* larvae was carried by *M. scabrinodis* or *M. rubra* workers after ant nests were destroyed, which suggests a lack of integration with host colonies. Results indicate that *Myrmica* species coming from the same site differ in their ability to adopt and rear *M. teleius* larvae but there was no obvious adaptation of this butterfly species to one of the host ant species. This may explain why, under natural conditions, all four ants can be used as hosts of this butterfly species. Slight advantages of particular *Myrmica* species as hosts at certain points in butterfly larval development can be explained by the ant species biology and colony structure rather than by specialization of *M. teleius*.

WITEK, M., SLIWINSKA, E.B., SKORKA, P., NOWICKI, P., SETTELE, J., & WOYCIECHOWSKI, M. 2006. Polymorphic growth in larvae of *Maculinea* butterflies, as an example of biennialism in myrmecophilous insects. *Oecologia Berlin* **148** (4): 729-733.

WITEK, M., SLIWINSKA, E.B., SKORKA, P., NOWICKI, P., WANTUCH, M., VRABEC, V., SETTELE, J., & WOYCIECHOWSKI, M. 2008. Host ant specificity of large blue butterflies *Phengaris* (*Maculinea*) (Lepidoptera: Lycaenidae) inhabiting humid grasslands in east-central Europe. *European Journal of Entomology* **105** (5): 871-877.

WOOD, G.A. 1987. The life history of *Jamides cytus claudia* (Waterhouse & Lyell) (Lepidoptera: Lycaenidae: Lycaeninae). *Queensland Naturalist* **28** (1-4): 52-54. [*Camponotus*; *Iridomyrmex cordatus*; *Polyrhachis mucronata*; Australia]

WOYCIECHOWSKI, M., SLOWIK, J., & MUCHLENBERG, M. 2006. Hosts of the butterfly, *Maculinea teleius*, among *Myrmica* ants in northern Mongolia (Lepidoptera: Lycaenidae; Hymenoptera: Formicidae). *Sociobiology* **48** (2): 493-502.

WRAGG, S.A., & ELGAR, M.A. 1997. Host plant use and ant interactions of the Victorian hairstreak *Pseudalmenus chlorinda zephyrus* Blanchard, a myrmecophilous lycaenid butterfly. *Victorian Naturalist (Blackburn)* **114** (2): 74-76. [*Anonychomyrma*]

WYNTHOFF, I., GRUTTERS, M. & VAN LANGEVELDE, F. 2008. Looking for the ants: selection of oviposition sites by two myrmecophilous butterfly species. *Animal Biology Leiden* **58** (4): 371-388. [*Maculinea teleius*, *Maculinea nausithous*, *Myrmica scabrinodis*]

YAMAGUCHI, S. 1988. *The life histories of five myrmecophilous lycaenid butterflies of Japan*. Kodansha, Tokyo: 1-262. [*Spindasis* (= *Cigaritis*) *takanomis*; *Maculinea arionides*; *Maculinea teleius*; *Aphaenogaster japonica*; *Myrmica ruginodis*; *Niphanda fusca*; *Shirozua jonasi*; *Lasius fuliginosis*; *Camponotus japonicus*; *Crematogaster matsumurai*; *Lasius jonasi*]

YOUNG, D.A. 2005. Spring-Summer-Autumn 2004-2005; field and other notes. *Victorian Entomologist* **35** (5): 87-97.

YOUNGSTEADT, E., & DE VRIES, P.J. 2005. The effects of ants on the entomophagous butterfly caterpillar *Feniseca tarquinius*, and the putative role of chemical camouflage in the *Feniseca*-Ant interaction. *Journal of Chemical Ecology* **31**