

- Vanengelsdorp D, Evans JD, Saegerman C, Mullin C, Haubruge E, Nguyen BK, et al. Colony collapse disorder: a descriptive study. PLoS One. 2009; 4(8):e6481. Epub 2009/08/04. doi: 10.1371/journal. pone.0006481 PMID: 19649264; PubMed Central PMCID: PMC2715894.
- Pisa LW, Amaral-Rogers V, Belzunces LP, Bonmatin JM, Downs CA, Goulson D, et al. Effects of neonicotinoids and fipronil on non-target invertebrates. Environ Sci Pollut Res Int. 2015; 22(1):68–102. Epub 2014/09/17. doi: 10.1007/s11356-014-3471-x PMID: 25223353; PubMed Central PMCID: PMC4284392.
- Henry M, Beguin M, Requier F, Rollin O, Odoux JF, Aupinel P, et al. A common pesticide decreases foraging success and survival in honey bees. Science. 2012; 336(6079):348–50. Epub 2012/03/31. doi: 10.1126/science.1215039 [pii]. PMID: 22461498.
- Whitehorn PR, O'Connor S, Wackers FL, Goulson D. Neonicotinoid pesticide reduces bumble bee colony growth and queen production. Science. 2012; 336(6079):351–2. Epub 2012/03/31. doi: 10.1126/science.1215025 [pii]. PMID: 22461500.
- Eisenstein M. Pesticides: Seeking answers amid a toxic debate. Nature. 2015; 521(7552):S52–5. Epub 2015/05/21. doi: 10.1038/521S52a [pii]. PMID: 25992672.
- 10. El Hassani AK, Dacher M, Gauthier M, Armengaud C. Effects of sublethal doses of fipronil on the behavior of the honeybee (Apis mellifera). Pharmacol Biochem Behav. 2005; 82(1):30–9. Epub 2005/08/17. doi: S0091-3057(05)00241-8 [pii] doi: 10.1016/j.pbb.2005.07.008 PMID: 16102801.
- Vidau C, Diogon M, Aufauvre J, Fontbonne R, Vigues B, Brunet JL, et al. Exposure to sublethal doses
 of fipronil and thiacloprid highly increases mortality of honeybees previously infected by Nosema ceranae. PLoS One. 2011; 6(6):e21550. Epub 2011/07/09. doi: 10.1371/journal.pone.0021550 PONE-D11-04998 [pii]. PMID: 21738706; PubMed Central PMCID: PMC3125288.
- Simon-Delso N, Amaral-Rogers V, Belzunces LP, Bonmatin JM, Chagnon M, Downs C, et al. Systemic insecticides (neonicotinoids and fipronil): trends, uses, mode of action and metabolites. Environ Sci Pollut Res Int. 2015; 22(1):5–34. Epub 2014/09/23. doi: 10.1007/s11356-014-3470-y PMID: 25233913; PubMed Central PMCID: PMC4284386.
- Khambay BPS, Jewess PJ. Pyrethroids. In: Gilbert LI, editor. Comprehensive Molecular Insect Science. Amsterdam: Elsevier; 2005. p. 1–29.
- Hardstone MC, Scott JG. Is Apis mellifera more sensitive to insecticides than other insects? Pest Manag Sci. 2010; 66(11):1171–80. Epub 2010/07/31. doi: 10.1002/ps.2001 PMID: 20672339.
- Decourtye A, Devillers J, Cluzeau S, Charreton M, Pham-Delegue MH. Effects of imidacloprid and deltamethrin on associative learning in honeybees under semi-field and laboratory conditions. Ecotoxicol Environ Saf. 2004; 57(3):410–9. PMID: <u>15041263</u>.
- Decourtye A, Devillers J, Genecque E, Le Menach K, Budzinski H, Cluzeau S, et al. Comparative sublethal toxicity of nine pesticides on olfactory learning performances of the honeybee Apis mellifera. Arch Environ Contam Toxicol. 2005; 48(2):242–50. PMID: <u>15750780</u>.
- Decourtye A, Devillers J, Aupinel P, Brun F, Bagnis C, Fourrier J, et al. Honeybee tracking with microchips: a new methodology to measure the effects of pesticides. Ecotoxicology. 2011; 20(2):429–37. Epub 2011/01/27. doi: 10.1007/s10646-011-0594-4 PMID: 21267650.
- van Dame R, Meled M, Colin M-E, Belzunces LP. Alteration of the homing-flight in the honey bee Apis mellifera L. Exposed to sublethal dose of deltamethrin. Environmental Toxicology and Chemistry. 1995; 14(5):855–60. doi: 10.1002/etc.5620140517
- 19. Winston ML. The biology of the honey bee: harvard university press; 1987. 281 p.
- 20. Carlson FD, Wilkie DR. Muscle Physiology: Prentice-Hall; 1974. 170 p.
- 21. Lambin M, Armengaud C, Raymond S, Gauthier M. Imidacloprid-induced facilitation of the proboscis extension reflex habituation in the honeybee. Arch Insect Biochem Physiol. 2001; 48(3):129–34. Epub 2001/10/24. doi: 10.1002/arch.1065 [pii]. PMID: 11673842.
- 22. El Hassani A, Dacher M, Gary V, Lambin M, Gauthier M, Armengaud C. Effects of Sublethal Doses of Acetamiprid and Thiamethoxam on the Behavior of the Honeybee (Apis mellifera). Arch Environ Contam Toxicol. 2008; 54(4):653–61. doi: 10.1007/s00244-007-9071-8 PMID: 18026773
- 23. Williamson SM, Willis SJ, Wright GA. Exposure to neonicotinoids influences the motor function of adult worker honeybees. Ecotoxicology. 2014; 23(8):1409–18. Epub 2014/07/12. doi: 10.1007/s10646-014-1283-x PMID: 25011924; PubMed Central PMCID: PMC4165879.
- 24. Eiri DM, Nieh JC. A nicotinic acetylcholine receptor agonist affects honey bee sucrose responsiveness and decreases waggle dancing. J Exp Biol. 2012; 215(Pt 12):2022–9. Epub 2012/05/25. doi: 10.1242/jeb.068718 215/12/2022 [pii]. PMID: 22623190.
- 25. Teeters BS, Johnson RM, Ellis MD, Siegfried BD. Using video-tracking to assess sublethal effects of pesticides on honey bees (Apis mellifera L.). Environ Toxicol Chem. 2012; 31(6):1349–54. Epub 2012/04/11. doi: 10.1002/etc.1830 PMID: 22488825.



- OECD. OECD guidelines for the testing of chemicals Number 214, Honeybee acute toxicity tests. 1998; 1:7.
- OEPP/EPPO. Environmental risk assessment scheme for plant protection products. Side-effects on honeybees. Bull OEPP/EPPO. 2010; 40:323–31.
- 28. Pain J. Note technique nouveau modèle de cagettes expérimentales pour le maintien d'abeilles et captivité. Ann Abeille. 1966; 9(1):71–6.
- Sokolowski MBC, Moine M, Naassila M. "Beetrack": A software for 2D open field locomotion analysis in honey bees. J Neurosci Meth. 2012; 207(2):211–7. doi: 10.1016/j.jneumeth.2012.03.006 PMID: ISI:000305669300010.
- Zuur AF, Ieno EN, Walker N, Saveliev AA, Smith GM. Mixed Effects Models and Extensions in Ecology With R: Springer-Verlag New York; 2009.
- 31. R Development Core Team. R: A Language and Environment for Statistical Computing. Computing RFfS, editor. Vienna, Austria2014.
- Desneux N, Decourtye A, Delpuech JM. The sublethal effects of pesticides on beneficial arthropods. Annu Rev Entomol. 2007; 52:81–106. PMID: 16842032.
- Delabie J, Bos C, Fonta C, Masson C. Toxic and repellent effects of cypermethrin on the honeybee: Laboratory, glasshouse and field experiments. Pesticide Science. 1985; 16(4):409–15. doi: 10.1002/ps.2780160417
- 34. Poquet Y, Bodin L, Tchamitchian M, Fusellier M, Giroud B, Lafay F, et al. A pragmatic approach to assess the exposure of the honey bee (Apis mellifera) when subjected to pesticide spray. PLoS One. 2014; 9(11):e113728. Epub 2014/11/21. doi: 10.1371/journal.pone.0113728 PONE-D-14-36042 [pii]. PMID: 25412103; PubMed Central PMCID: PMC4239102.
- Dahlgren L, Johnson RM, Siegfried BD, Ellis MD. Comparative toxicity of acaricides to honey bee (Hymenoptera: Apidae) workers and queens. J Econ Entomol. 2012; 105(6):1895–902. Epub 2013/01/30. PMID: 23356051.
- U.S. Environmental Protection Agency. ECOTOXicology Database System. Version 4.0. Available: http://www.epagov/ecotox/. 2015.
- Collet C. Excitation-contraction coupling in skeletal muscle fibers from adult domestic honeybee. Pflugers Arch. 2009; 458(3):601–12. Epub 2009/02/10. doi: 10.1007/s00424-009-0642-6 PMID: 19198873.
- 38. Collet C, Belzunces L. Excitable properties of adult skeletal muscle fibres from the honeybee Apis mellifera. J Exp Biol. 2007; 210(3):454–64. doi: 10.1242/jeb.02667
- 39. Kadala A, Charreton M, Jakob I, Cens T, Rousset M, Chahine M, et al. Pyrethroids differentially alter voltage-gated sodium channels from the honeybee central olfactory neurons. PLoS One. 2014; 9(11): e112194. Epub 2014/11/13. doi: 10.1371/journal.pone.0112194 PONE-D-14-28292 [pii]. PMID: 25390654; PubMed Central PMCID: PMC4229128.
- Kadala A, Charreton M, Jakob I, Le Conte Y, Collet C. A use-dependent sodium current modification induced by type I pyrethroid insecticides in honeybee antennal olfactory receptor neurons. Neurotoxicology. 2011; 32(3):320–30. Epub 2011/03/08. doi: 10.1016/j.neuro.2011.02.007 S0161-813X(11) 00044-1 [pii]. PMID: 21377491.
- Du Y, Nomura Y, Satar G, Hu Z, Nauen R, He SY, et al. Molecular evidence for dual pyrethroid-receptor sites on a mosquito sodium channel. Proc Natl Acad Sci U S A. 2013; 110(29):11785–90. Epub 2013/07/04. doi: 10.1073/pnas.1305118110 [pii]. PMID: 23821746; PubMed Central PMCID: PMC3718148.
- O'Reilly AO, Khambay BP, Williamson MS, Field LM, Wallace BA, Davies TG. Modelling insecticide-binding sites in the voltage-gated sodium channel. Biochem J. 2006; 396(2):255–63. Epub 2006/02/16. doi: BJ20051925 [pii] doi: 10.1042/BJ20051925 PMID: 16475981; PubMed Central PMCID: PMC1462714.
- 43. Gosselin-Badaroudine P, Moreau A, Delemotte L, Cens T, Collet C, Rousset M, et al. Characterization of the honeybee AmNav1 channel and tools to assess the toxicity of insecticides. Scientific Reports. 2015;in press.
- **44.** Soderlund DM, Clark JM, Sheets LP, Mullin LS, Piccirillo VJ, Sargent D, et al. Mechanisms of pyrethroid neurotoxicity: implications for cumulative risk assessment. Toxicology. 2002; 171(1):3–59. PMID: 11812616.
- 45. Shafer TJ, Meyer DA. Effects of pyrethroids on voltage-sensitive calcium channels: a critical evaluation of strengths, weaknesses, data needs, and relationship to assessment of cumulative neurotoxicity. Toxicology and Applied Pharmacology. 2004; 196(2):303–18. PMID: 15081275
- 46. Cens T, Rousset M, Collet C, Charreton M, Garnery L, Le Conte Y, et al. Molecular characterization and functional expression of the Apis mellifera voltage-dependent Ca2+ channels. Insect biochemistry