

GEPHE SUMMARY

	Gephebase Gene		GepheID
Odorant receptor 3 (OR3) (https://www.gephebase.org/search-criteria?/and+Gene Gephebase="Odorant receptor 3 (OR3)"#gephebase-summary-title)		GP00000749	
	Entry Status	Martin	Main curator
Published			

PHENOTYPIC CHANGE

	Trait Category		
Behavior (https://www.gephebase.org/search-criteria?/and+Trait Category="Behavior"#gephebase-summary-title)			
	Trait		
Olfactory behavior (pheromone) (<a (pheromone)"#gephebase-summary-title"="" behavior="" href="https://www.gephebase.org/search-criteria?/and+Trait=" olfactory="">https://www.gephebase.org/search-criteria?/and+Trait="Olfactory behavior (pheromone)"#gephebase-summary-title)			
	Trait State in Taxon A		
Ostrinia nubilalis			
	Trait State in Taxon B		
Ostrinia furnacalis			
	Ancestral State		
Data not curated			
	Taxonomic Status		
Interspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic Status="Interspecific"#gephebase-summary-title)			
	Taxon A		Taxon B
	Latin Name		Latin Name
Ostrinia nubilalis (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms="Ostrinia nubilalis"#gephebase-summary-title)		Ostrinia furnacalis (<a furnacalis"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=" ostrinia="">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms="Ostrinia furnacalis"#gephebase-summary-title)	
	Common Name		Common Name
European corn borer		Asian corn borer	
	Synonyms		Synonyms
Pyralis nubilalis; Pyrausta nubilalis; European corn borer; Ostrinia nubilalis (Hubner, 1796)		Asian corn borer; Ostrinia furnacalis (Guenée, 1854); Ostrinia furnacalis	
	Rank		Rank
species		species	
	Lineage		Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Amphiesmenoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Ditrysia; Obtectomera; Pyraloidea; Crambidae; Pyraustinae; Ostrinia		cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Amphiesmenoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Ditrysia; Obtectomera; Pyraloidea; Crambidae; Pyraustinae; Ostrinia	
	Parent		Parent
Ostrinia () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 29056)		Ostrinia () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 29056)	
	NCBI Taxonomy ID		NCBI Taxonomy ID
29057 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 29057)		93504 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 93504)	
	is Taxon A an Intraspecies?		is Taxon B an Intraspecies?
No		No	

GENOTYPIC CHANGE

	Generic Gene Name		UniProtKB Ostrinia nubilalis
OR3		D3J5H6 (http://www.uniprot.org/uniprot/D3J5H6)	
	Synonyms		GenebankID or UniProtKB
-		AFK30395 (https://www.ncbi.nlm.nih.gov/nucleotide/AFK30395)	
	String		
-			
	Sequence Similarities		
Belongs to the insect chemoreceptor superfamily. Heteromeric odorant receptor channel (TC 1.A.69) family.			
	GO - Molecular Function		
GO:0005549 : odorant binding (https://www.ebi.ac.uk/QuickGO/term/GO:0005549)			
GO:0004984 : olfactory receptor activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004984)			
	GO - Biological Process		
GO:0007165 : signal transduction (https://www.ebi.ac.uk/QuickGO/term/GO:0007165)			
	GO - Cellular Component		
GO:0016021 : integral component of membrane			

(<https://www.ebi.ac.uk/QuickGO/term/GO:0016021>)
GO:0005886 : plasma membrane (<https://www.ebi.ac.uk/QuickGO/term/GO:0005886>)

Presumptive Null

No (<https://www.gephebase.org/search-criteria?/and+Presumptive Null=~No^#gephebase-summary-title>)

Molecular Type

Coding (<https://www.gephebase.org/search-criteria?/and+Molecular Type=~Coding^#gephebase-summary-title>)

Aberration Type

SNP (<https://www.gephebase.org/search-criteria?/and+Aberration Type=~SNP^#gephebase-summary-title>)

SNP Coding Change

Nonsynonymous

Molecular Details of the Mutation

A148T

Experimental Evidence

Candidate Gene (<https://www.gephebase.org/search-criteria?/and+Experimental Evidence=~Candidate Gene^#gephebase-summary-title>)

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	-	-	-

Main Reference

Single mutation to a sex pheromone receptor provides adaptive specificity between closely related moth species. (2012) (<https://pubmed.ncbi.nlm.nih.gov/22891317>)

Authors

Leary GP; Allen JE; Bunger PL; Luginbill JB; Linn CE; Macallister IE; Kavanaugh MP; Wanner KW

Abstract

Sex pheromone communication, acting as a prezygotic barrier to mating, is believed to have contributed to the speciation of moths and butterflies in the order Lepidoptera. Five decades after the discovery of the first moth sex pheromone, little is known about the molecular mechanisms that underlie the evolution of pheromone communication between closely related species. Although Asian and European corn borers (ACB and ECB) can be interbred in the laboratory, they are behaviorally isolated from mating naturally by their responses to subtly different sex pheromone isomers, (E)-12- and (Z)-12-tetradecenyl acetate and (E)-11- and (Z)-11-tetradecenyl acetate (ACB: E12, Z12; ECB: E11, Z11). Male moth olfactory systems respond specifically to the pheromone blend produced by their conspecific females. In vitro, ECB(Z) odorant receptor 3 (OR3), a sex pheromone receptor expressed in male antennae, responds strongly to E11 but also generally to the Z11, E12, and Z12 pheromones. In contrast, we show that ACB OR3, a gene that has been subjected to positive selection (d_{1%} = 2.9), responds preferentially to the ACB E12 and Z12 pheromones. In Ostrinia species the amino acid residue corresponding to position 148 in transmembrane domain 3 of OR3 is alanine (A), except for ACB OR3 that has a threonine (T) in this position. Mutation of this residue from A to T alters the pheromone recognition pattern by selectively reducing the E11 response ~1/414-fold. These results suggest that discrete mutations that narrow the specificity of more broadly responsive sex pheromone receptors may provide a mechanism that contributes to speciation.

Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

@SexualTrait