GEPHE SUMMARY

Gephebase Gene
Odorant receptor 3 (OR3) (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^Odorant receptor 3 (OR3)^#gephebase-summary-title)

GepheID
GP00000749

Entry Status
Published

Main curator
Martin

PHENOTYPIC CHANGE

Trait Category
Behavior (https://www.gephebase.org/search-criteria?/and+Trait Category=^Behavior^#gephebase-summary-title)

Trait
Olfactory behavior (pheromone) (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

Latin Name
Ostrinia nubilalis (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Ostrinia nubilalis^#gephebase-summary-title)

Common Name
European corn borer

Synonyms
Pyralis nubilalis; Pyrausta nubilalis; European corn borer; Ostrinia nubilalis (Hubner, 1796)

Rank
species

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

Parent
Ostrinia () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 29056)

NCBI Taxonomy ID
29057 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 29057)

is Taxon A an Infraspecies?
No

Taxon B

Latin Name
Ostrinia furnacalis (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Ostrinia furnacalis^#gephebase-summary-title)

Common Name
Asian corn borer

Synonyms
Asian corn borer; Ostrinia furnacalis (Guenee, 1854); Ostrinia furnicalis

Rank
species

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

Parent
Ostrinia () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 29056)

NCBI Taxonomy ID
93504 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 93504)

is Taxon B an Infraspecies?
No

GENOTYPIC CHANGE

Generic Gene Name
OR3

Synonyms
-

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

UniProtKB Ostrinia nubilalis
D3J5H6 (http://www.uniprot.org/uniprot/D3J5H6)

GenebankID or UniProtKB
AFK30395 (https://www.ncbi.nlm.nih.gov/nuccore/AFK30395)

(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 (Ï‰ = 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 â^¼14-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