GEPHE SUMMARY

Gephebase Gene
fatty acid synthase (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^fatty acid synthase^#gephebase-summary-title)

GepheID
GP00002063

Entry Status
Published

Main curator
Courtier

PHENOTYPIC CHANGE

Trait #1

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

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

Trait State in Taxon A
D. serrata - relatively desiccation resistant and produces relatively large amounts of mbCHCs

Trait State in Taxon B
D. birchii - desiccation sensitive and produces very low amounts of mbCHCs

Trait #2

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

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

Trait State in Taxon A
D. serrata - relatively desiccation resistant and produces relatively large amounts of mbCHCs

Trait State in Taxon B
D. birchii - desiccation sensitive and produces very low amounts of mbCHCs

Ancestral State
Unknown

Taxonomic Status
Interspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic Status=^Interspecific^#gephebase-summary-title)

Taxon A

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

Common Name
-

Synonyms
Drosophila serrata Malloch, 1927

Rank
species

Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Diptera; Brachycera; Muscomorpha; Eremoneura; Cyclorrhapha; Schizophora; Acalyptratae; Ephydroidea; Drosophilidae; Drosophilinae; Drosophilini; Drosophila; Sophophora; melanogaster group; montium subgroup; Drosophila serrata species complex

Parent
Drosophila serrata species complex () - (Rank: no rank) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 446045)

NCBI Taxonomy ID
7274 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7274)

is Taxon A an Infraspecies?
No

Taxon B

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

Common Name
-

Synonyms
Drosophila birchii Dobzhansky & Mather, 1961

Rank
species

Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Diptera; Brachycera; Muscomorpha; Eremoneura; Cyclorrhapha; Schizophora; Acalyptratae; Ephydroidea; Drosophilidae; Drosophilinae; Drosophilini; Drosophila; Sophophora; melanogaster group; montium subgroup; Drosophila serrata species complex

Parent
Drosophila serrata species complex () - (Rank: no rank) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 446045)

NCBI Taxonomy ID
46829 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 46829)

is Taxon B an Infraspecies?
No

GENOTYPIC CHANGE

Generic Gene Name

FASN3

UniProtKB Drosophila melanogaster

Q7PLB8 (http://www.uniprot.org/uniprot/Q7PLB8)

Synonyms

CG17374; Dmel\CG17374; DM_7289423; FAS; FASN[CG17374]; FAS[CG17374]; Dmel_CG17374

GenebankID or UniProtKB

()

String

7227.FBpp0297101 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 7227.FBpp0297101)

Sequence Similarities

-

GO - Molecular Function

GO:0016491 : oxidoreductase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0016491)
GO:0031177 : phosphopantetheine binding (https://www.ebi.ac.uk/QuickGO/term/GO:0031177)
GO:0016788 : hydrolase activity, acting on ester bonds (https://www.ebi.ac.uk/QuickGO/term/GO:0016788)
GO:0004312 : fatty acid synthase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004312)

GO - Biological Process

GO:0009058 : biosynthetic process (https://www.ebi.ac.uk/QuickGO/term/GO:0009058)

GO - Cellular Component

-

Presumptive Null

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

Molecular Type

Cis-regulatory (https://www.gephebase.org/search-criteria?/and+Molecular Type=^Cis-regulatory^#gephebase-summary-title)

Aberration Type

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

Molecular Details of the Mutation

No expression of the gene in D. birchii. The coding region of the D. birchii gene is intact. Cis-regulatory region tested in reporter assays in D. melanogaster - exact causing mutation(s) unknown. RNAi against mFAS/CG17354 in D. serrata recapitylates the D. birchii phenotype.

Experimental Evidence

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

Main Reference

A single gene affects both ecological divergence and mate choice in Drosophila. (2014) (https://pubmed.ncbi.nlm.nih.gov/24526311)

Authors

Chung H; Loehlin DW; Dufour HD; Vaccarro K; Millar JG; Carroll SB

Abstract

Evolutionary changes in traits involved in both ecological divergence and mate choice may produce reproductive isolation and speciation. However, there are few examples of such dual traits, and the genetic and molecular bases of their evolution have not been identified. We show that methyl-branched cuticular hydrocarbons (mbCHCs) are a dual trait that affects both desiccation resistance and mate choice in Drosophila serrata. We identify a fatty acid synthase mFAS (CG3524) responsible for mbCHC production in Drosophila and find that expression of mFAS is undetectable in oenocytes (cells that produce CHCs) of a closely related, desiccation-sensitive species, D. birchii, due in part to multiple changes in cis-regulatory sequences of mFAS. We suggest that ecologically influenced changes in the production of mbCHCs have contributed to reproductive isolation between the two species.

Additional References

RELATED GEPHE

Related Genes

1 (fatty acyl-CoA reductase FAR2-B) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^7274^/and+Trait=Dessication tolerance/or+Taxon ID=^7274^/and+Trait=Pheromone production/or+Taxon ID=^46829^/and+Trait=Dessication tolerance/or+Taxon ID=^46829^/and+Trait=Pheromone production/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

Direction of change unknown but since this is a full loss of expression in oenocytes we can hypothesize that D. birchii displays the derived trait.