GEPHE SUMMARY

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

GepheID
GP00002040

Entry Status
Published

Main curator
Courtier

PHENOTYPIC CHANGE

Trait #1

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

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

Trait State in Taxon A
bearded dragons

Trait State in Taxon B
scaleless bearded dragons - homozygotes lack all scales on the body (ventral/dorsal scales and lateral spines) and femoral glands ; they also exhibit reduced dentition and (paradoxically) longer claws at birth

Trait #2

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

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

Trait State in Taxon A
bearded dragons

Trait State in Taxon B
scaleless bearded dragons - homozygotes lack all scales on the body (ventral/dorsal scales and lateral spines) and femoral glands ; they also exhibit reduced dentition and (paradoxically) longer claws at birth

Trait #3

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

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

Trait State in Taxon A
bearded dragons

Trait State in Taxon B
scaleless bearded dragons - homozygotes lack all scales on the body (ventral/dorsal scales and lateral spines) and femoral glands ; they also exhibit reduced dentition and (paradoxically) longer claws at birth

Ancestral State
Taxon A

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

Taxon A

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

Common Name
central bearded dragon

Synonyms
central bearded dragon; ZMB 30101; ZMB:30101; Pogona vitticepes

Rank

Taxon B

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

Common Name
central bearded dragon

Synonyms
central bearded dragon; ZMB 30101; ZMB:30101; Pogona vitticepes

Rank

species

Lineage

cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Sauropsida; Sauria; Lepidosauria; Squamata; Bifurcata; Unidentata; Episquamata; Toxicofera; Iguania; Acrodonta; Agamidae; Amphibolurinae; Pogona

Parent

Pogona () - (Rank: genus)
(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 52201)

NCBI Taxonomy ID

103695
(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 103695)

is Taxon A an Infraspecies?

No

species

Lineage

cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Sauropsida; Sauria; Lepidosauria; Squamata; Bifurcata; Unidentata; Episquamata; Toxicofera; Iguania; Acrodonta; Agamidae; Amphibolurinae; Pogona

Parent

Pogona () - (Rank: genus)
(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 52201)

NCBI Taxonomy ID

103695
(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 103695)

is Taxon B an Infraspecies?

No

GENOTYPIC CHANGE

Generic Gene Name

Eda

Synonyms

Ta; Ed1; HED; EDA1; XLHED; tabby; Eda-A1; Eda-A2; Tnlg7c

String

10090.ENSMUSP00000109409
(http://string-db.org/newstring_cgi/show_network_section.pl?identifier=
10090.ENSMUSP00000109409)

Sequence Similarities

Belongs to the tumor necrosis factor family.

GO - Molecular Function

GO:0038177 : death receptor agonist activity
(https://www.ebi.ac.uk/QuickGO/term/GO:0038177)
GO:0005123 : death receptor binding
(https://www.ebi.ac.uk/QuickGO/term/GO:0005123)
GO:0005164 : tumor necrosis factor receptor binding
(https://www.ebi.ac.uk/QuickGO/term/GO:0005164)

GO - Biological Process

GO:0006955 : immune response (https://www.ebi.ac.uk/QuickGO/term/GO:0006955)
GO:0030154 : cell differentiation (https://www.ebi.ac.uk/QuickGO/term/GO:0030154)
GO:0043473 : pigmentation (https://www.ebi.ac.uk/QuickGO/term/GO:0043473)
GO:0010628 : positive regulation of gene expression
(https://www.ebi.ac.uk/QuickGO/term/GO:0010628)
GO:0051092 : positive regulation of NF-kappaB transcription factor activity
(https://www.ebi.ac.uk/QuickGO/term/GO:0051092)
GO:0019221 : cytokine-mediated signaling pathway
(https://www.ebi.ac.uk/QuickGO/term/GO:0019221)
GO:0007160 : cell-matrix adhesion (https://www.ebi.ac.uk/QuickGO/term/GO:0007160)
GO:0010467 : gene expression (https://www.ebi.ac.uk/QuickGO/term/GO:0010467)
GO:0001942 : hair follicle development
(https://www.ebi.ac.uk/QuickGO/term/GO:0001942)
GO:0060789 : hair follicle placode formation
(https://www.ebi.ac.uk/QuickGO/term/GO:0060789)
GO:0042475 : odontogenesis of dentin-containing tooth
(https://www.ebi.ac.uk/QuickGO/term/GO:0042475)
GO:0090263 : positive regulation of canonical Wnt signaling pathway
(https://www.ebi.ac.uk/QuickGO/term/GO:0090263)
GO:0043123 : positive regulation of I-kappaB kinase/NF-kappaB signaling
(https://www.ebi.ac.uk/QuickGO/term/GO:0043123)
GO:1901224 : positive regulation of NIK/NF-kappaB signaling
(https://www.ebi.ac.uk/QuickGO/term/GO:1901224)
GO:1901222 : regulation of NIK/NF-kappaB signaling
(https://www.ebi.ac.uk/QuickGO/term/GO:1901222)
GO:0060662 : salivary gland cavitation
(https://www.ebi.ac.uk/QuickGO/term/GO:0060662)
GO:0043588 : skin development (https://www.ebi.ac.uk/QuickGO/term/GO:0043588)
GO:0061153 : trachea gland development
(https://www.ebi.ac.uk/QuickGO/term/GO:0061153)

GO - Cellular Component

GO:0005887 : integral component of plasma membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:0005887)
GO:0005576 : extracellular region (https://www.ebi.ac.uk/QuickGO/term/GO:0005576)
GO:0005789 : endoplasmic reticulum membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:0005789)
GO:0045177 : apical part of cell (https://www.ebi.ac.uk/QuickGO/term/GO:0045177)
GO:0005581 : collagen trimer (https://www.ebi.ac.uk/QuickGO/term/GO:0005581)
GO:0005811 : lipid droplet (https://www.ebi.ac.uk/QuickGO/term/GO:0005811)

UniProtKB Mus musculus

O54693 (http://www.uniprot.org/uniprot/O54693)

GenebankID or UniProtKB

()

Presumptive Null

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

Molecular Type

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

Aberration Type

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

Insertion Size

1-10 kb

Molecular Details of the Mutation

5â€²688â€“bp insertion of a transposon of the LTR-Gypsy family which generates a new splice donor site (gt) 42 bases upstream of the wild-type donor site; thus generating a 14â€“amino acid deletion in the corresponding transcript

Experimental Evidence

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

Main Reference

The anatomical placode in reptile scale morphogenesis indicates shared ancestry among skin appendages in amniotes. (2016) (https://pubmed.ncbi.nlm.nih.gov/28439533)

Authors

Di-PoÃ¯ N; Milinkovitch MC

Abstract

Most mammals, birds, and reptiles are readily recognized by their hairs, feathers, and scales, respectively. However, the lack of fossil intermediate forms between scales and hairs and substantial differences in their morphogenesis and protein composition have fueled the controversy pertaining to their potential common ancestry for decades. Central to this debate is the apparent lack of an "anatomical placode" (that is, a local epidermal thickening characteristic of feathers' and hairs' early morphogenesis) in reptile scale development. Hence, scenarios have been proposed for the independent development of the anatomical placode in birds and mammals and parallel co-option of similar signaling pathways for their morphogenesis. Using histological and molecular techniques on developmental series of crocodiles and snakes, as well as of unique wild-type and EDA (ectodysplasin A)-deficient scaleless mutant lizards, we show for the first time that reptiles, including crocodiles and squamates, develop all the characteristics of an anatomical placode: columnar cells with reduced proliferation rate, as well as canonical spatial expression of placode and underlying dermal molecular markers. These results reveal a new evolutionary scenario where hairs, feathers, and scales of extant species are homologous structures inherited, with modification, from their shared reptilian ancestor's skin appendages already characterized by an anatomical placode and associated signaling molecules.

Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

@Parallelism @TE @Splicing