

Schirmer, S. C., Gawryszewski, F. M., Cardoso, M. Z., and Pessoa, D. M. A. (2023) Melanism and color saturation of butterfly assemblages: a comparison between a tropical rainforest and a xeric white forest. *Front. Ecol. Evol.*

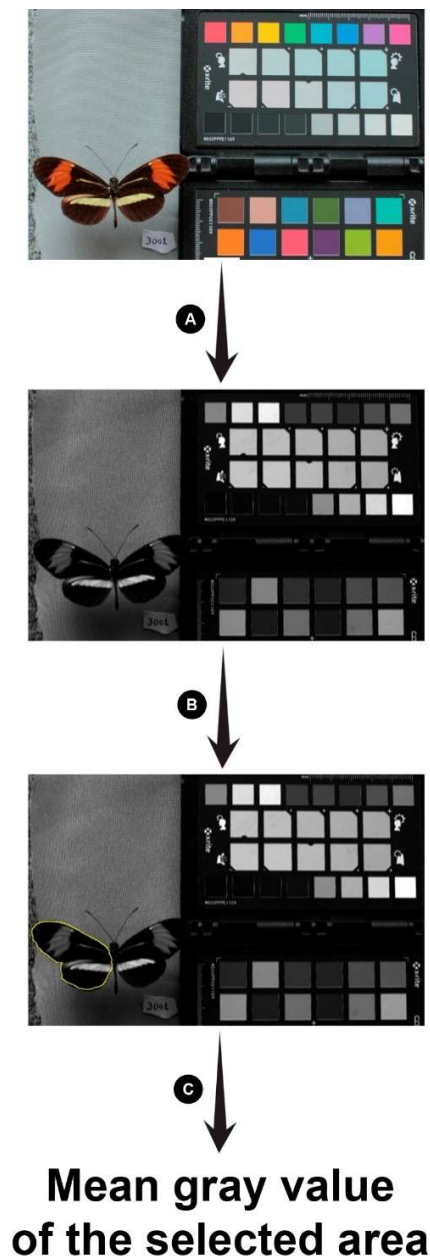
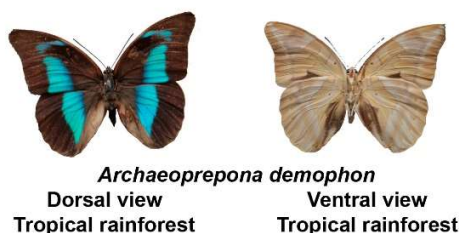


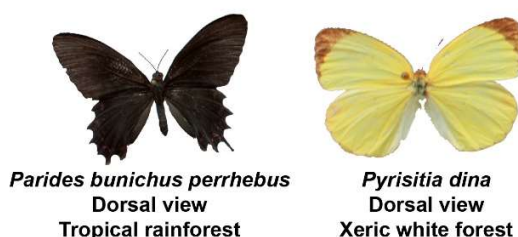
Figure S1. Procedures used to acquire the mean gray value for each specimen of butterfly. For aesthetic reasons, the photos shown here have been cropped and do not show the entire color chart. To extract the mean gray value of each color image, we converted it to gray scale (A), selected the area of interest (B), and calculated the overall mean grey value by averaging the three channels (R, G and B) from all the pixels falling inside the region of interest (C).

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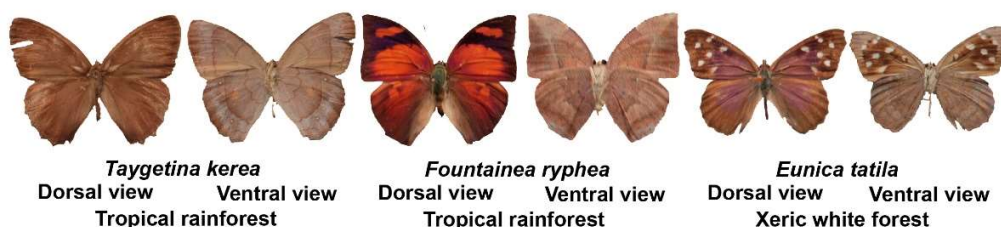
Tropical rainforest butterflies have dorsal wing surfaces that are more melanic than their own ventral wing surfaces



Tropical rainforest butterflies have dorsal wing surfaces that are more melanic when compared to xeric white forest butterflies



In general, butterflies' dorsal wing sides present a higher variance in saturation, when compared to their own ventral wing sides



Butterflies that inhabit both biomes have dorsal wing surfaces that are more melanic than their own ventral wing surfaces

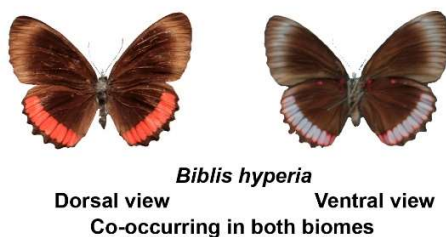


Figure S2. Graphic illustration exemplifying the results found by the present study.

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Table S1. List of species (N = 46) that were considered in the present study and that occur exclusively in the tropical rainforest or in the xeric white forest. The geographic coordinates of their capture sites are also shown.

Scientific name	Family	Subfamily	Tribe	Geographic coordinates	
				Latitude	Longitude
<i>Helias phalaenoides</i>	Hesperiidae	Pyrginae	Erynnini	-5,928,611	-35,184,722
<i>Calycopis caulonia</i>	Lycaenidae	Theclinae	Eumaeini	-8,723,951	-35,177,947
<i>Heliconius melpomene</i>	Nymphalidae	Biblidinae	Ageroniini	-6,081,667	-35,181,944
<i>Morpho helenor</i>	Nymphalidae	Satyrinae	Morphini	-6,081,667	-35,181,944
<i>Caligo illioneus</i>	Nymphalidae	Satyrinae	Brassolini	-6,081,667	-35,181,944
<i>Caligo teucer</i>	Nymphalidae	Satyrinae	Brassolini	-6,081,667	-35,181,944
<i>Mechanitis polymnia</i>	Nymphalidae	Danainae	Ithomiini	-12,559,838	-41,395,822
<i>Philaethria dido</i>	Nymphalidae	Heliconiinae	Heliconiini	-5,928,611	-35,184,722
<i>Pierella lamia</i>	Nymphalidae	Satyrinae	Haeterini	-16,387,501	-39,169,713
<i>Fountainea glycerium glycerium</i>	Nymphalidae	Charaxinae	Anaeini	-5,928,611	-35,184,722
<i>Fountainea ryphea</i>	Nymphalidae	Charaxinae	Anaeini	-5,928,611	-35,184,722
<i>Brassolis sophorae</i>	Nymphalidae	Satyrinae	Brassolini	-6,037,006	-35,434,997
<i>Taygetina kerea</i>	Nymphalidae	Satyrinae	Satyrini	-5,928,611	-35,184,722
<i>Opsiphanes invirae</i>	Nymphalidae	Satyrinae	Brassolini	-6,081,667	-35,181,944
<i>Pharneuptychia innocentia</i>	Nymphalidae	Satyrinae	Satyrini	-5,928,611	-35,184,722
<i>Pharneuptychia phares</i>	Nymphalidae	Satyrinae	Satyrini	-5,928,611	-35,184,722
<i>Hypna clytemnestra</i>	Nymphalidae	Charaxinae	Anaeini	-6,578,889	-37,255,556
<i>Fountainea halice moretta</i>	Nymphalidae	Charaxinae	Anaeini	-6,578,889	-37,255,556
<i>Anartia amathea</i>	Nymphalidae	Nymphalinae	Victorinini	-6,578,889	-37,255,556
<i>Eunica tatila</i>	Nymphalidae	Biblidinae	Catonephelini	-6,578,889	-37,255,556
<i>Marpesia petreus</i>	Nymphalidae	Cyrestinae	Cyrestini	-6,374,137	-35,021,018
<i>Adelpha cytherea</i>	Nymphalidae	Limenitidinae	Limenitidini	-8,723,951	-35,177,947
<i>Taygetis echo echo</i>	Nymphalidae	Satyrinae	Satyrini	-8,723,951	-35,177,947
<i>Archaeoprepona demophon occidentalis</i>	Nymphalidae	Charaxinae	Preponini	-7,923,649	-34,933,720
<i>Hamadryas chloe</i>	Nymphalidae	Biblidinae	Ageroniini	-6,226,389	-35,065,556
<i>Vanessa myrinna</i>	Nymphalidae	Nymphalinae	Nymphalini	-8,884,256	-36,514,522
<i>Lycorea hallia</i>	Nymphalidae	Danainae	Danaini	-12,559,838	-41,395,822
<i>Pierella hyalinus</i>	Nymphalidae	Satyrinae	Haeterini	-12,559,838	-41,395,822
<i>Ithomia lichyi</i>	Nymphalidae	Danainae	Ithomiini	-12,559,838	-41,395,822
<i>Adelpha melona</i>	Nymphalidae	Limenitidinae	Limenitidini	-12,559,838	-41,395,822
<i>Pyrrhogyra neaerea</i>	Nymphalidae	Biblidinae	Epiphelini	-12,559,838	-41,395,822
<i>Heliconius numata ethra</i>	Nymphalidae	Heliconiinae	Heliconiini	-12,567,910	-38,036,874
<i>Nica flavilla</i>	Nymphalidae	Biblidinae	Epiphelini	-12,567,910	-38,036,874
<i>Protesilaus helios</i>	Papilionidae	Papilioninae	Leptocircini	-6,081,667	-35,181,944
<i>Parides zacyanthus polymetus</i>	Papilionidae	Papilioninae	Troidini	-5,886,576	-35,370,446

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<i>Parides bunichus almas</i>	Papilionidae	Papilioninae	Troidini	-13,585,672	-41,820,970
<i>Parides bunichus perrhebus</i>	Papilionidae	Papilioninae	Troidini	-13,410,566	-41,286,627
<i>Parides zacyanthus</i>	Papilionidae	Papilioninae	Troidini	-12,567,910	-38,036,874
<i>Itaballia demophile</i>	Pieridae	Pierinae	Pierini	-12,559,838	-41,395,822
<i>Eurema deva</i>	Pieridae	Coliadinae		-5,835,556	-35,190,556
<i>Phoebis argante</i>	Pieridae	Coliadinae		-5,928,611	-35,184,722
<i>Pyrisitia dina</i>	Pieridae	Coliadinae		-8,884,256	-36,514,522
<i>Nymphidium baeotia</i>	Riodinidae	Riodininae	Nymphidiini	-6,081,667	-35,181,944
<i>Stalachtis phlegia</i>	Riodinidae	Riodininae	Stalachtini	-6,081,667	-35,181,944
<i>Melanis xenia</i>	Riodinidae	Riodininae	Riodinini	-12,559,838	-41,395,822
<i>Stalachtis phlegia susanna</i>	Riodinidae	Riodininae	Stalachtini	-16,387,501	-39,169,713

Table S2. List of species (N = 75) occurring concurrently in both biomes (i.e., tropical rainforest and the xeric white forest). The geographic coordinates of their capture sites are also shown.

Scientific name	Family	Subfamily	Tribe	Geographic coordinates	
				Latitude	Longitude
<i>Adelpha cytherea aea</i>	Nymphalidae	Limenitidinae	Limenitidini	-6,578,889	-37,255,556
<i>Agraulis vanillae</i>	Nymphalidae	Heliconiinae	Heliconiini	-12,203,343	-38,972,406
<i>Anartia jatrophae</i>	Nymphalidae	Nymphalinae	Victorinini	-5,928,611	-35,184,722
<i>Anteos clorinde</i>	Pieridae	Coliadinae		-5,928,611	-35,184,722
<i>Anteos menippe</i>	Pieridae	Coliadinae		-6,081,667	-35,181,944
<i>Archaeoprepona demophon thalpius</i>	Nymphalidae	Charaxinae	Preponini	-5,928,611	-35,184,722
<i>Archaeoprepona demophoon antimache</i>	Nymphalidae	Charaxinae	Preponini	-5,928,611	-35,184,722
<i>Ascia monuste</i>	Pieridae	Pierinae		-6,087,893	-37,914,359
<i>Astrartes anaphus</i>	Hesperiidae	Eudaminae		-5,928,611	-35,184,722
<i>Astrartes fulgurator</i>	Hesperiidae	Eudaminae		-5,928,611	-35,184,722
<i>Battus polydamas</i>	Papilionidae	Papilioninae	Troidini	-5,835,556	-35,190,556
<i>Biblis hyperia</i>	Nymphalidae	Biblidinae	Biblidini	-6,578,889	-37,255,556
<i>Callicore sorana</i>	Nymphalidae	Biblidinae	Callicorini	-8,884,256	-36,514,522
<i>Catagramma pygas</i>	Nymphalidae	Biblidinae	Callicorini	-6,081,667	-35,181,944
<i>Chorinea licursis</i>	Riodinidae	Riodininae	Riodinini	-5,928,611	-35,184,722
<i>Cogia calchas</i>	Hesperiidae	Eudaminae		-6,465,000	-38,177,500
<i>Colobura dirce</i>	Nymphalidae	Nymphalinae	Nymphalini	-6,081,667	-35,181,944
<i>Danaus eresimus</i>	Nymphalidae	Danainae	Danaini	-6,578,889	-37,255,556
<i>Danaus erippus</i>	Nymphalidae	Danainae	Danaini	-12,455,391	-41,473,025
<i>Dannaus gilippus</i>	Nymphalidae	Danainae	Danaini	-6,578,889	-37,255,556
<i>Dryadula phaetusa</i>	Nymphalidae	Heliconiinae	Heliconiini	-12,559,838	-41,395,822
<i>Dynamine postverta</i>	Nymphalidae	Limenitidinae	Eubagini	-13,585,672	-41,820,970

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<i>Eueides isabella</i>	Nymphalidae	Heliconiinae	Heliconiini	-5,767,011	-35,254,060
<i>Euptoeita hegesia</i>	Nymphalidae	Heliconiinae	Argynnini	-6,087,893	-37,914,359
<i>Eurema albula</i>	Pieridae	Coliadinae		-12,567,910	-38,036,874
<i>Eurema elathea</i>	Pieridae	Coliadinae		-6,087,893	-37,914,359
<i>Eurema elathea flavescens</i>	Pieridae	Coliadinae		-5,925,485	-35,199,084
<i>Hamadryas amphinome</i>	Nymphalidae	Biblidinae	Ageroniini	-5,886,576	-35,370,446
<i>Hamadryas epinome</i>	Nymphalidae	Biblidinae	Ageroniini	-12,559,838	-41,395,822
<i>Hamadryas februa</i>	Nymphalidae	Biblidinae	Ageroniini	-6,263,056	-36,517,778
<i>Hamadryas feronia</i>	Nymphalidae	Biblidinae	Ageroniini	-6,578,889	-37,255,556
<i>Heliconius erato phyllis</i>	Nymphalidae	Heliconiinae	Heliconiini	-6,087,893	-37,914,359
<i>Heliconius ethilla</i>	Nymphalidae	Heliconiinae	Heliconiini	-12,567,910	-38,036,874
<i>Heliconius ethilla narceae</i>	Nymphalidae	Heliconiinae	Heliconiini	-12,567,910	-38,036,874
<i>Heliconius sara apseudes</i>	Nymphalidae	Heliconiinae	Heliconiini	-13,410,566	-41,286,627
<i>Heliopetes arsalte</i>	Hesperiidae	Pyrginae	Pyrgini	-6,081,667	-35,181,944
<i>Hemiargus hanno</i>	Lycaenidae	Polyommata	Polyommata	-6,578,889	-37,255,556
<i>Heraclides anchisiades capys</i>	Papilionidae	Papilioninae	Papilionini	-5,900,615	-35,265,643
<i>Heraclides thoas brasiliensis</i>	Papilionidae	Papilioninae	Papilionini	-5,928,611	-35,184,722
<i>Hermeuptychia hermes</i>	Nymphalidae	Satyrinae	Satyrini	-5,928,611	-35,184,722
<i>Historis acheronta</i>	Nymphalidae	Nymphalinae	Coeini	-6,578,889	-37,255,556
<i>Historis odius</i>	Nymphalidae	Nymphalinae	Coeini	-6,081,667	-35,181,944
<i>Hylephila phyleus</i>	Hesperiidae	Hesperiinae	Hesperiini	-6,578,889	-37,255,556
<i>Junonia evarete</i>	Nymphalidae	Nymphalinae	Junoniini	-6,087,893	-37,914,359
<i>Libytheana carinenta</i>	Nymphalidae	Libytheinae		-12,455,391	-41,473,025
<i>Lycorea halia discreta</i>	Nymphalidae	Danainae	Danaini	-5,928,611	-35,184,722
<i>Magneuptychia libye</i>	Nymphalidae	Satyrinae	Satyrini	-6,081,667	-35,181,944
<i>Marpesia chiron</i>	Nymphalidae	Cyrestinae	Cyrestini	-5,928,611	-35,184,722
<i>Mechanitis lysimnia neseia</i>	Nymphalidae	Danainae	Ithomiini	-12,567,910	-38,036,874
<i>Mestra hersilia hypermestra</i>	Nymphalidae	Biblidinae	Biblidini	-12,559,838	-41,395,822
<i>Methona singularis</i>	Nymphalidae	Danainae	Ithomiini	-5,835,556	-35,190,556
<i>Myscelia orsis</i>	Nymphalidae	Biblidinae	Catonephelini	-12,924,161	-38,470,333
<i>Ortilia ithra</i>	Nymphalidae	Nymphalinae	Melitaeini	-6,087,893	-37,914,359
<i>Pareuptychia ocirrhoe</i>	Nymphalidae	Satyrinae	Satyrini	-7,923,649	-34,933,720
<i>Pheobis sennae</i>	Pieridae	Coliadinae		-6,578,889	-37,255,556
<i>Phoebis philea</i>	Pieridae	Coliadinae		-5,835,556	-35,190,556
<i>Phoebis sennae marcellina</i>	Pieridae	Coliadinae		-5,928,611	-35,184,722
<i>Prepona laertes demodice</i>	Nymphalidae	Charaxinae	Preponini	-5,928,611	-35,184,722
<i>Pseudolycaena marsyas</i>	Lycaenidae	Theclinae	Eumaeini	-6,081,667	-35,181,944
<i>Pyrgus orcus</i>	Hesperiidae	Pyrginae	Pyrgini	-5,928,611	-35,184,722
<i>Pyrisitia nise</i>	Pieridae	Coliadinae		-11,566,612	-41,187,565
<i>Pyrisitia nise tenella</i>	Pieridae	Coliadinae		-5,928,611	-35,184,722
<i>Scada reckia</i>	Nymphalidae	Danainae	Ithomiini	-8,884,256	-36,514,522

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<i>Siderone galanthis</i>	Nymphalidae	Charaxinae	Anaeini	-6,081,667	-35,181,944
<i>Siproeta stelenes</i>	Nymphalidae	Nymphalinae	Victorinini	-6,081,667	-35,181,944
<i>Smyrna blomfidiana</i>	Nymphalidae	Nymphalinae	Nymphalini	-5,928,611	-35,184,722
<i>Synargis calyce</i>	Riodinidae	Riodininae	Nymphidiini	-8,723,951	-35,177,947
<i>Taygetis laches</i>	Nymphalidae	Satyrinae	Satyrini	-5,928,611	-35,184,722
<i>Urbanus simplicius</i>	Hesperiidae	Eudaminae		-6,081,667	-35,181,944
<i>Xenophanes tryxus</i>	Hesperiidae	Pyrginae	Pyrgini	-5,928,611	-35,184,722
<i>Yphthimoides affinis</i>	Nymphalidae	Satyrinae	Satyrini	-5,928,611	-35,184,722
<i>Yphthimoides manasses</i>	Nymphalidae	Satyrinae	Satyrini	-5,928,611	-35,184,722
<i>Yphthimoides renata</i>	Nymphalidae	Satyrinae	Satyrini	-13,011,529	-41,375,505
<i>Zaretis isidora</i>	Nymphalidae	Charaxinae	Anaeini	-5,928,611	-35,184,722
<i>Zaretis itys</i>	Nymphalidae	Charaxinae	Anaeini	-6,081,667	-35,181,944