

## Supplementary Material

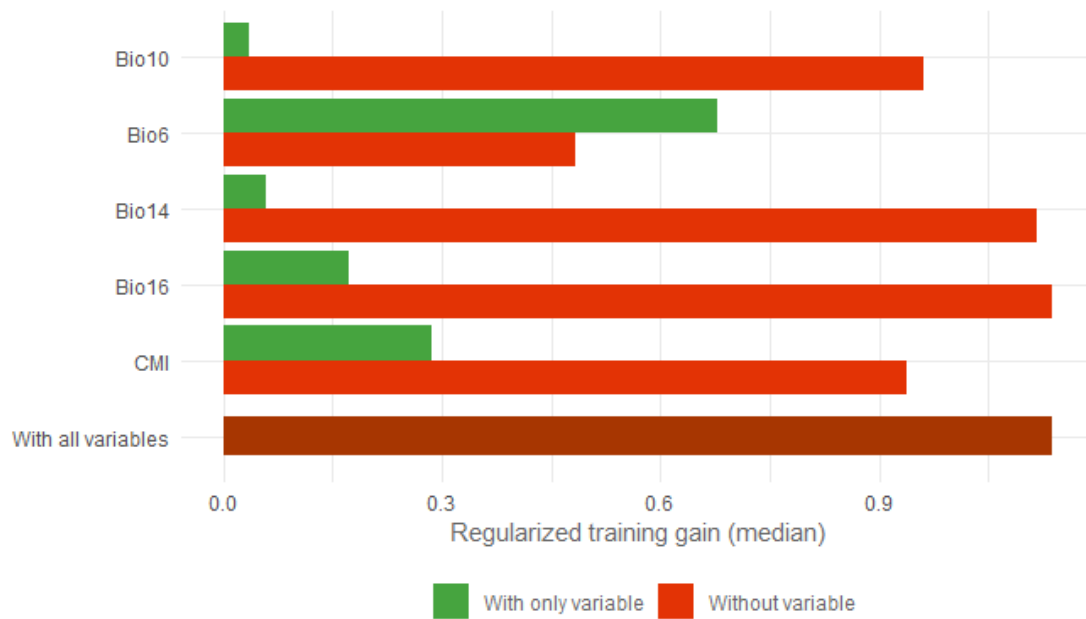
### **Environmental variables determining the distribution of an avian botfly: the case of the *Philornis torquans* complex (Diptera: Muscidae) in South America**

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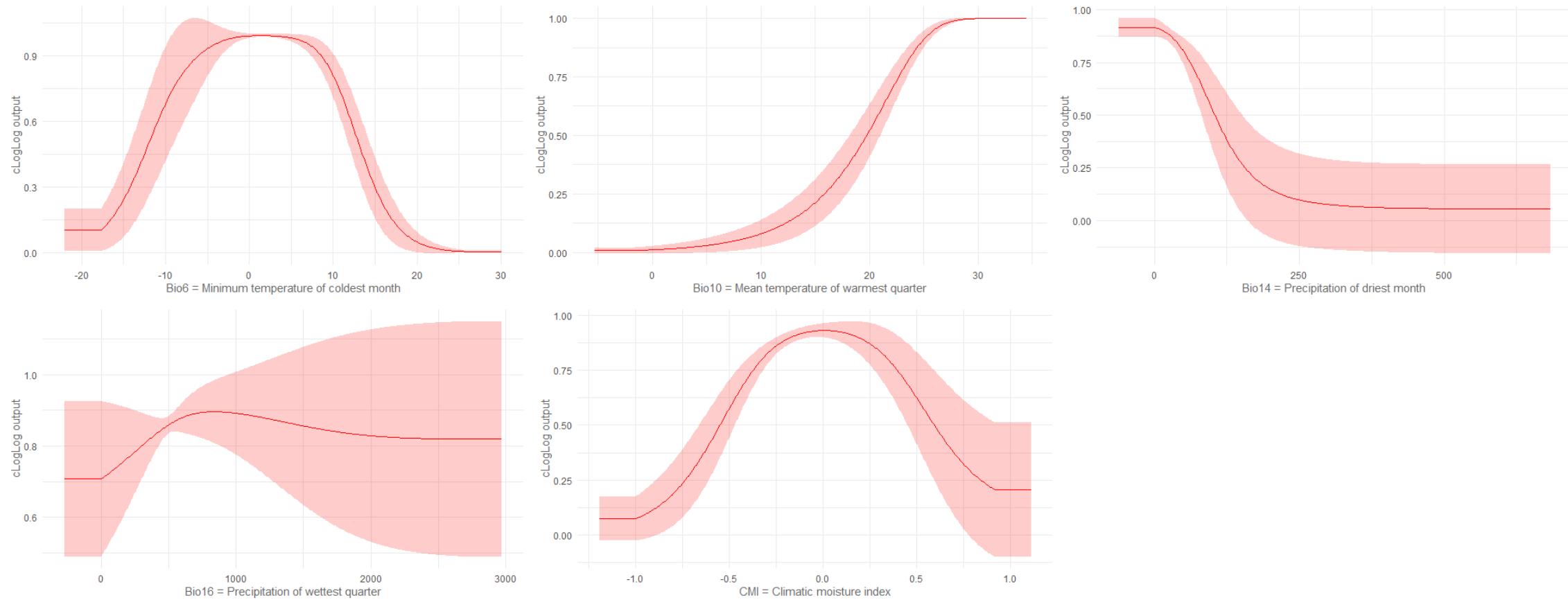
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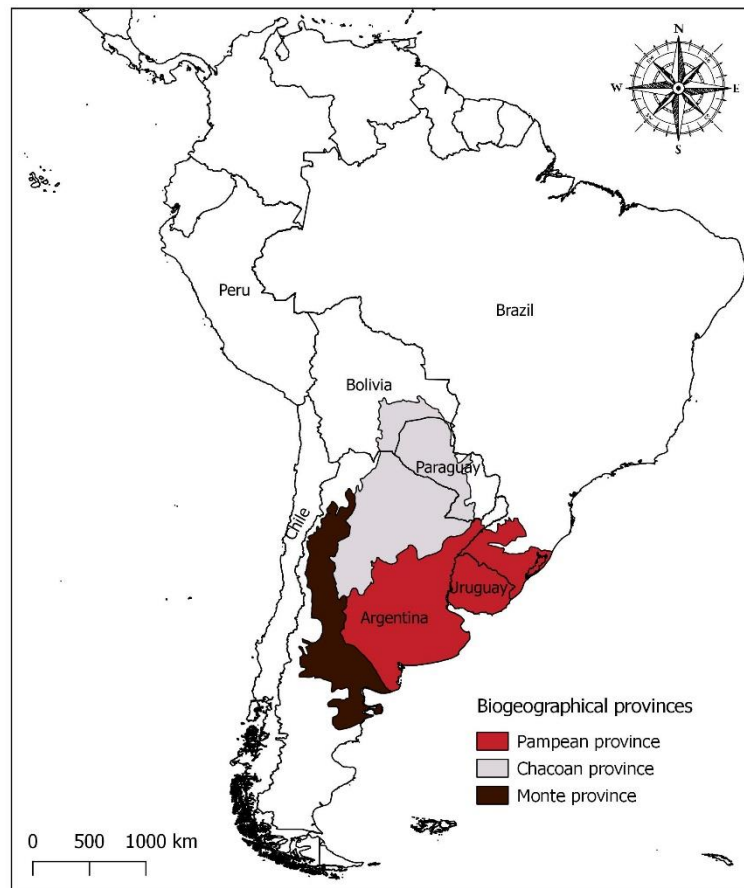
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**Figure S1.** Results of the jackknife test of variable importance, when a variable is used in isolation or it is omitted from modelling. References: Bio10 = mean temperature of warmest quarter; Bio06 = minimum temperature of coldest month; Bio14 = precipitation of driest month; Bio16 = precipitation of wettest quarter; CMI = climatic moisture index. [Colours after the Green-Grass Tanager *Chlorornis riefferii*].



**Figure S2.** Response curves showing how the predicted probability of presence changes as each environmental variable is varied, keeping all other environmental variables at their average sample value.



**Figure S3.** Biogeographical provinces from Argentina sustaining environments suitable for the *Philornis torquans* complex (see in Morrone, 2017). [Colours after Multicolored Tanager *Chlorochrysa nitidissima*]

**Table S1.** Geographic coordinates of the presence localities of the *Philornis torquans* complex (morphs *Philornis torquans* and *Philornis seguyi*) included in this study.

Record N°	Country	Geographic coordinates	Host	References
<i>Philornis seguyi</i>				
1	Argentina	S 35°34'52", W 58°1'3"	<i>Sicalis flaveola</i>	(Patitucci, 2010)
2	Argentina	S 35°20'0", W 57°11'0"	<i>Agelaioides badius</i> ; <i>Mimus saturninus</i> ; <i>Paroaria coronata</i> ; <i>Troglodytes aedon</i>	(Segura & Reboreda, 2011)
3	Argentina	S 35°8'4", W 57°23'30"	<i>Anumbius annumbi</i> ; <i>Mimus saturninus</i> ; <i>Phacellodomus sibilatrix</i> ; <i>Phacellodomus striaticollis</i> ; <i>Satrapa icterophrys</i> ; <i>Sicalis flaveola</i> ; <i>Troglodytes aedon</i> ; <i>Zonotrichia capensis</i>	(Mason, 1985)
4	Argentina	S 35°8'0", W 57°25'0"	<i>Mimus saturninus</i> ; <i>Molothrus bonariensis</i> ; <i>Pitangus sulphuratus</i> ; <i>Pyrocephalus rubinus</i> ; <i>Satrapa icterophrys</i> ; <i>Troglodytes aedon</i>	(Couri <i>et al.</i> , 2005)
5	Argentina	S 35°2'56", W 57°37'26"	<i>Anumbius annumbi</i> ; <i>Mimus saturninus</i>	(Mason, 1985)
6	Argentina	S 34°51'13", W 58°7'26"	ND	(Patitucci, 2010)
7	Argentina	S 34°49'33", W 58°23'42"	ND	(Patitucci, 2010)

8	Argentina	S 34°9'14", W 58°55'43"	<i>Anumbius annumbi</i> ; <i>Phacellodomus striaticollis</i> ; <i>Pitangus sulphuratus</i>	(Patitucci, 2010)
9	Argentina	S 33°58'0", W 59°19'0"	<i>Mimus saturninus</i> ; <i>Molothrus bonariensis</i>	(Rabuffetti & Reboreda, 2007)
10	Argentina	S 33°27'56", W 67°31'55"	<i>Turdus amaurochalinus</i>	(Monje <i>et al.</i> , 2013)
11	Argentina	S 31°38'10", W 60°40'24"	<i>Troglodytes aedon</i>	(Quiroga & Reboreda, 2012)
12	Argentina	S 31°38'0", W 60°35'0"	<i>Troglodytes aedon</i>	(Quiroga & Reboreda, 2012)
13	Argentina	S 31°38'0", W 61°31'0"	<i>Troglodytes aedon</i>	(Couri <i>et al.</i> , 2009)
14	Argentina	S 31°23'0", W 63°53'0"	<i>Anumbius annumbi</i> ; <i>Pseudoseisura lophotes</i>	(Nores, 1995)
15	Argentina	S 31°21'0", W 60°59'0"	<i>Certhiaxis cinnamomeus</i>	(Couri <i>et al.</i> , 2009)
16	Argentina	S 28°39'17", W 57°25'48"	<i>Phacellodomus ruber</i>	∅
17	Argentina	S 28°39'5", W 57°25'13"	<i>Pitangus sulphuratus</i>	∅
18	Argentina	S 26°54'24", W 59°0'54"	<i>Anumbius annumbi</i>	(Turienzo & Di Iorio, 2014)
19	Argentina	S 25°41'0", W 54°27'0"	<i>Cacicus haemorrhous</i>	(Fraga, 2011)

***Philornis torquans***

20	Argentina	S 36°37'15", W 64°17'28"	<i>Anumbius annumbi</i>	(Turienzo & Di Iorio, 2014)
21	Argentina	S 32°38'0", W 62°41'0"	<i>Mimus saturninus</i>	(García, 1952)
22	Argentina	S 31°31'0", W 60°51'0"	<i>Phacellodomus ruber</i>	(Couri <i>et al.</i> , 2009)
23	Argentina	S 31°30'0", W 60°47'0"	<i>Furnarius rufus</i> ; <i>Paroaria coronata</i> ; <i>Phacellodomus ruber</i> ; <i>Phacellodomus</i>	(Manzoli <i>et al.</i> , 2013)

			<i>sibilatrix; Pitangus sulphuratus; Sicalis flaveola</i>	
24	Argentina	S 31°23'08", W 60°55'0"	<i>Agelaioides badius; Anumbius annumbi; Coryphistera alaudina; Elaenia spectabilis; Furnarius rufus; Leptasthenura platensis; Machetornis rixosus; Mimus saturninus; Molothrus bonariensis; Paroaria coronata; Phacellodomus ruber; Phacellodomus striaticolis; Phacellodomus sibilatrix; Pitangus sulphuratus; Polioptila dumicola; Pseudoseisura lophotes; Saltator coerulescens; Schoeniophylax phryganophilus; Sicalis flaveola; Sublegatus modestus; Suiriri suiriri; Synallaxis frontalis; Taraba major; Troglodytes aedon; Zenaida auriculata</i>	(De la Peña <i>et al.</i> , 2003; Couri <i>et al.</i> , 2009; Antoniazzi <i>et al.</i> , 2011; Manzoli <i>et al.</i> , 2013)
25	Argentina	S 31°21'0", W 60°56'0"	<i>Certhiaxis cinnamomeus</i>	(De la Peña <i>et al.</i> , 2003)
26	Argentina	S 27°20'45", W 65°35'34"	<i>Pitangus sulphuratus; Sporophila nigricollis</i>	(Nielsen, 1912; Turienzo & Di Iorio, 2007)
27	Argentina	S 27°19'48", W 65°34'48"	ND	(Dodge, 1968)

28	Brazil	S 22°45'19", W 46°8'41"	ND	(Löwenberg-Neto & De Carvalho, 2013)
29	Brazil	S 22°44'38", W 43°42'27"	ND	(Löwenberg-Neto & De Carvalho, 2013)
30	Brazil	S 22°27'0", W 42°58'48"	ND	(Löwenberg-Neto & De Carvalho, 2013)
31	Brazil	S 19°37'0", W 44°02'0"	<i>Phacellodomus rufifrons</i>	(Costa <i>et al.</i> , 2019)
32	Brazil	S 16°4'14", W 57°40'44"	ND	(Löwenberg-Neto & De Carvalho, 2013)
33	Brazil	S 15°32'30", W 47°36'0"	<i>Neothraupis fasciata</i>	(Couri <i>et al.</i> , 2018)
34	Brazil	S 15°31'53", W 40°54'34"	ND	(Löwenberg-Neto & De Carvalho, 2013)

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ND: No data given regarding host species; ⚡: In this paper



**Table S2.** Variables excluded from selection, and sets of variables included in this study.

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**Sets of Variables**

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**Variables excluded from selection**

Bio08 = mean temperature of wettest quarter,  
Bio09 = mean temperature of driest quarter,  
Bio18 = precipitation of warmest quarter,  
Bio19 = precipitation of driest quarter,  
PETColdestQuarter = mean PET of coldest quarter  
PETWarmestQuarter = mean PET of warmest quarter  
PETDriestQuarter = mean PET of driest quarter  
PETWettestQuarter = mean PET of wettest quarter  
monthCountByTemp10 = number of months with mean temperature > 10°C

**SET 1: based on current knowledge**

Bio06 = minimum temperature of coldest month  
Bio10 = mean temperature of warmest quarter  
Bio14 = precipitation of driest month  
Bio16 = precipitation of wettest quarter  
CMI = climatic moisture index

**SET 2a: uncorrelated variables from CHELSA**

Bio01 = annual mean temperature  
Bio02 = mean diurnal range  
Bio04 = temperature seasonality  
Bio14 = precipitation of driest month  
Bio15 = precipitation seasonality

**SET 3a, uncorrelated variables from CHELSA + ENVIREM**

Bio11 = mean temperature of coldest quarter  
Bio14 = precipitation of driest month  
Bio15 = precipitation seasonality  
embergerQ = Emberger's pluviothermic quotient  
PETseasonality = monthly variability in potential evapotranspiration (PET)

**SET 4, uncorrelated variables from CHELSA + ENVIREM (climatic + topographic)**

Bio11 = mean temperature of coldest quarter  
Bio14 = precipitation of driest month  
Bio15 = precipitation seasonality  
embergerQ = Emberger's pluviothermic quotient  
PETseasonality = monthly variability in PET  
TRI = terrain roughness index

**SET 2b, relevant variables from CHELSA**

Bio11 = mean temperature of coldest quarter

Bio14 = precipitation of driest month

**SET 3b, relevant variables from CHELSA + ENVIREM**

Bio11 = mean temperature of coldest quarter

Bio14 = precipitation of driest month

CONT = continentality

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