

Table S1. Results of Permutation F -tests on RDA data from the RGB, CIELab and Blowfly datasets. Factors in bold are those that explained a significant proportion of overall WIP variation. Sp = species, Wi = wing.

		Sp	Sex	Wi	Sp:Sex	Sp:Wi	Sex:Wi	Sp:Sex:Wi
RGB: colour	<i>F</i>	17.48	6.05	2.11	5.87	0.98	0.89	0.9
	<i>P</i>	0.001	0.001	0.047	0.001	0.459	0.529	0.584
RGB: contrast	<i>F</i>	44.24	7.28	2.11	3.57	1.2	1.18	0.78
	<i>P</i>	0.001	0.001	0.104	0.001	0.261	0.287	0.705
CIELab: colour	<i>F</i>	12.81	7.23	2.87	4.52	0.81	0.46	0.69
	<i>P</i>	0.001	0.001	0.01	0.001	0.817	0.919	0.933
CIELab: contrast	<i>F</i>	35.79	12	1.59	5.31	0.87	0.56	0.69
	<i>P</i>	0.001	0.001	0.156	0.001	0.605	0.662	0.817
Blowfly: colour	<i>F</i>	21.88	7.45	2.26	7.6	1.04	1.04	0.92
	<i>P</i>	0.001	0.001	0.064	0.001	0.414	0.37	0.515
Blowfly: contrast	<i>F</i>	25.22	7.24	2.25	6.49	1.26	1.45	0.79
	<i>P</i>	0.001	0.001	0.071	0.001	0.191	0.186	0.734

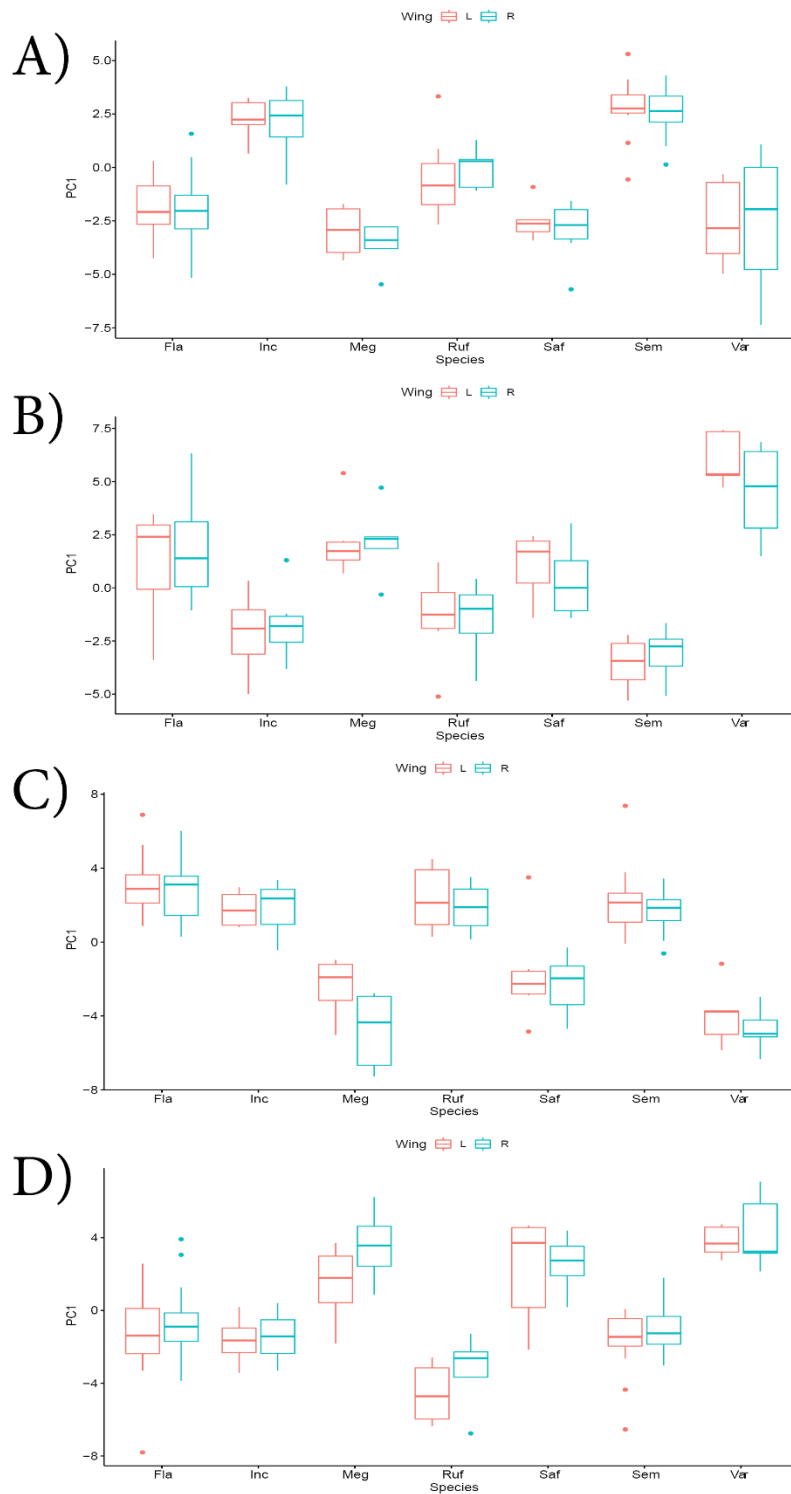


Figure S1. Asymmetry in WIPs represented by mean principal component (PC1) values for *Chrysomya* species (based on the blowfly dataset). A) female colour, B) female contrast, C) male colour, D) male contrast.

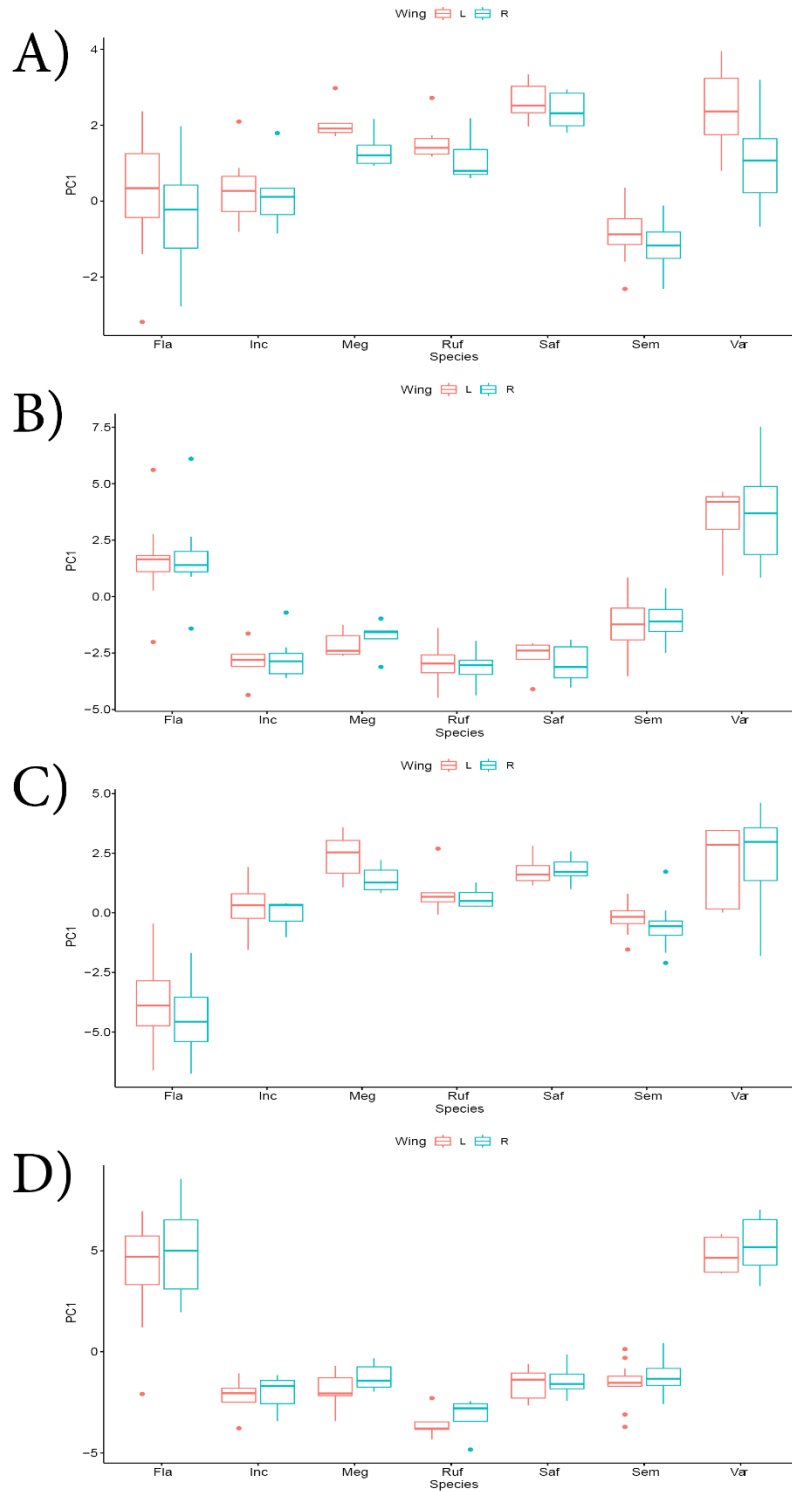


Figure S2. Asymmetry in WIPs represented by mean principal components (PC1) for *Chrysomya* species (based on the CIELab dataset). A) female colour, B) female contrast, C) male colour, D) male contrast.

Figure S1 & S2 – Asymmetry in *Chrysomya* WIPs

Importantly, while the RDA suggested that the effect of wing (left or right) was not significant when considered with species, sex, or species \times sex (Supplementary Material 1: Table 1) inspection of mean PCA values (Supplementary Figures 1 & 2) suggests that there are intra-sexual differences in mean WIP colour and WIP colour contrast between left and right wings. Asymmetries in wing morphology have been widely reported in flying insects (Windig and Nylin 1999; Koshio et al. 2007; McLachlan 2010) and it is therefore likely that asymmetries in WIPs are also widespread. It is important that future studies consider asymmetries between left and right wings when assessing WIP variation – particularly considering that the symmetry of the WIP may itself be a component of the signal (Møller and Pomiankowski 1993; Uetz and Smith 1999).

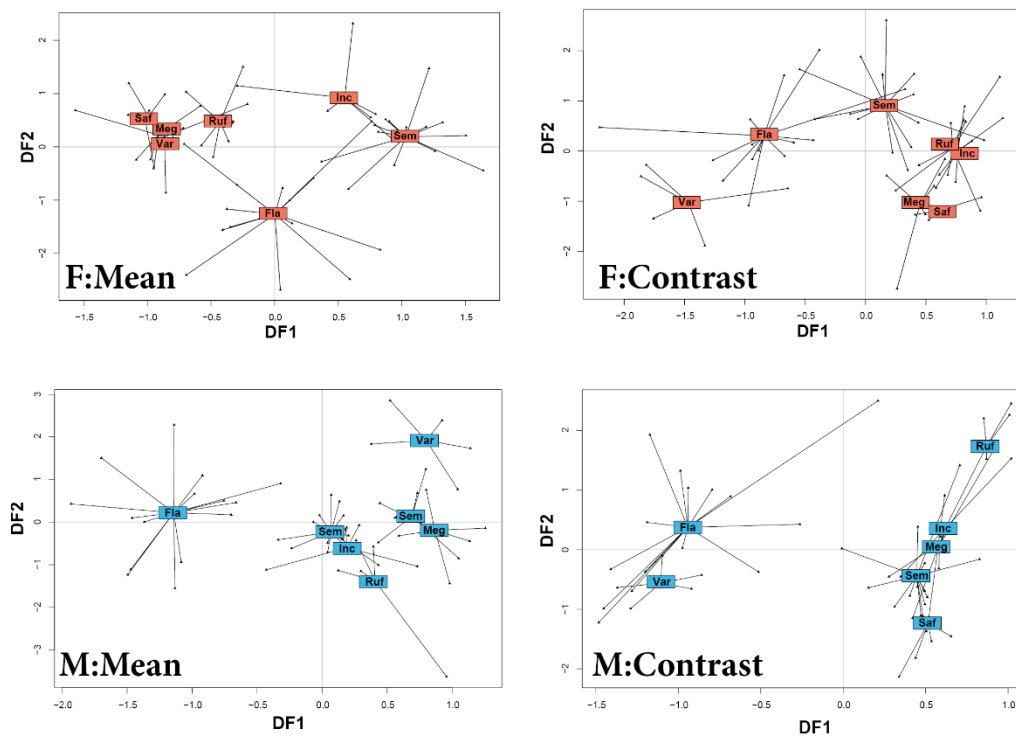


Fig S3. Quantitative differences in the wing interference patterns (WIP) of male (M) and female (F) Australian *Chrysomya* represented by discriminant factors 1 (DF1) and 2 (DF2). Results are from a redundancy discriminant analysis of WIP colour (as represented by average measurements of L, A and B values) and WIP colour contrast (as represented by standard deviations in L, A and B values). All measurements were made in CIELab ‘human visual space’ using the Multispectral Image Analysis and Calibration Toolbox for ImageJ (MICA toolbox) (Troscianko et al. 2019).

Table S2. Pairwise comparisons between species, based on redundancy discriminant analysis of WIP colour (as represented by average measurements of L, A and B values) and WIP colour contrast (as represented by standard deviations L, A and B values). All measurements were made in CIELab ‘human visual space’ using the Multispectral Image Analysis and Calibration Toolbox for ImageJ (MICA toolbox) (Troszianko et al. 2019). Bold values indicate significant differences. F = Female, M = Male.

F_Colour_CIELab	Fla	Inc	Meg	Ruf	Saf	Sem
Inc	0.0019	-	-	-	-	-
Meg	0.0019	0.0019	-	-	-	-
Ruf	0.0019	0.003	0.151	-	-	-
Saf	0.0019	0.003	0.588	0.0893	-	-
Sem	0.0019	0.0056	0.0019	0.0019	0.0019	-
Var	0.003	0.0019	0.982	0.2123	0.61	0.0019
F_Contrast_CIELab	Fla	Inc	Meg	Ruf	Saf	Sem
Inc	0.0023	-	-	-	-	-
Meg	0.0023	0.0292	-	-	-	-
Ruf	0.0023	0.951	0.0398	-	-	-
Saf	0.0023	0.0126	0.839	0.0161	-	-
Sem	0.0076	0.0126	0.0023	0.0161	0.0023	-
Var	0.0105	0.0023	0.0042	0.0023	0.0126	0.0023
M_Colour_CIELab	Fla	Inc	Meg	Ruf	Saf	Sem
Inc	0.0135	-	-	-	-	-
Meg	0.0035	0.1447	-	-	-	-
Ruf	0.0035	0.03832	0.0472	-	-	-
Saf	0.0035	0.1038	0.449	0.0336	-	-
Sem	0.0035	0.2354	0.009	0.0129	0.0129	-
Var	0.0035	0.0129	0.0105	0.0129	0.0129	0.0035
M_Contrast_CIELab	Fla	Inc	Meg	Ruf	Saf	Sem
Inc	0.0191	-	-	-	-	-
Meg	0.009	0.672	-	-	-	-
Ruf	0.007	0.0875	0.0372	-	-	-
Saf	0.0042	0.066	0.0766	0.0191	-	-
Sem	0.0042	0.0766	0.1659	0.0042	0.0766	-
Var	0.1116	0.0158	0.0163	0.0227	0.0042	0.0042

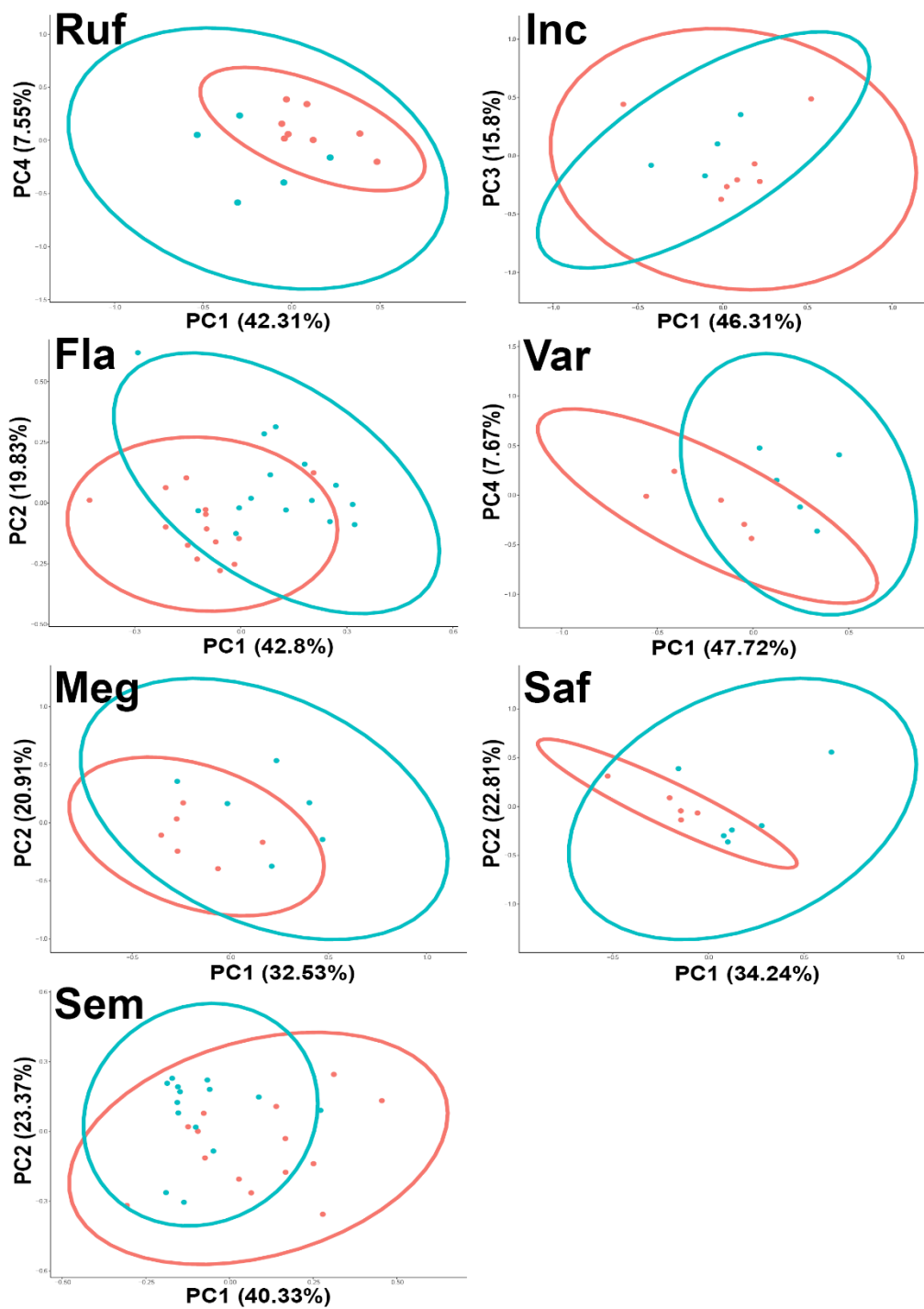


Figure S4. PCA plots of sex-specific differences in the CIELab average colour of WIPs (mean L, A and B values). The blue dots and ellipses represent males, while red dots and ellipses represent females.

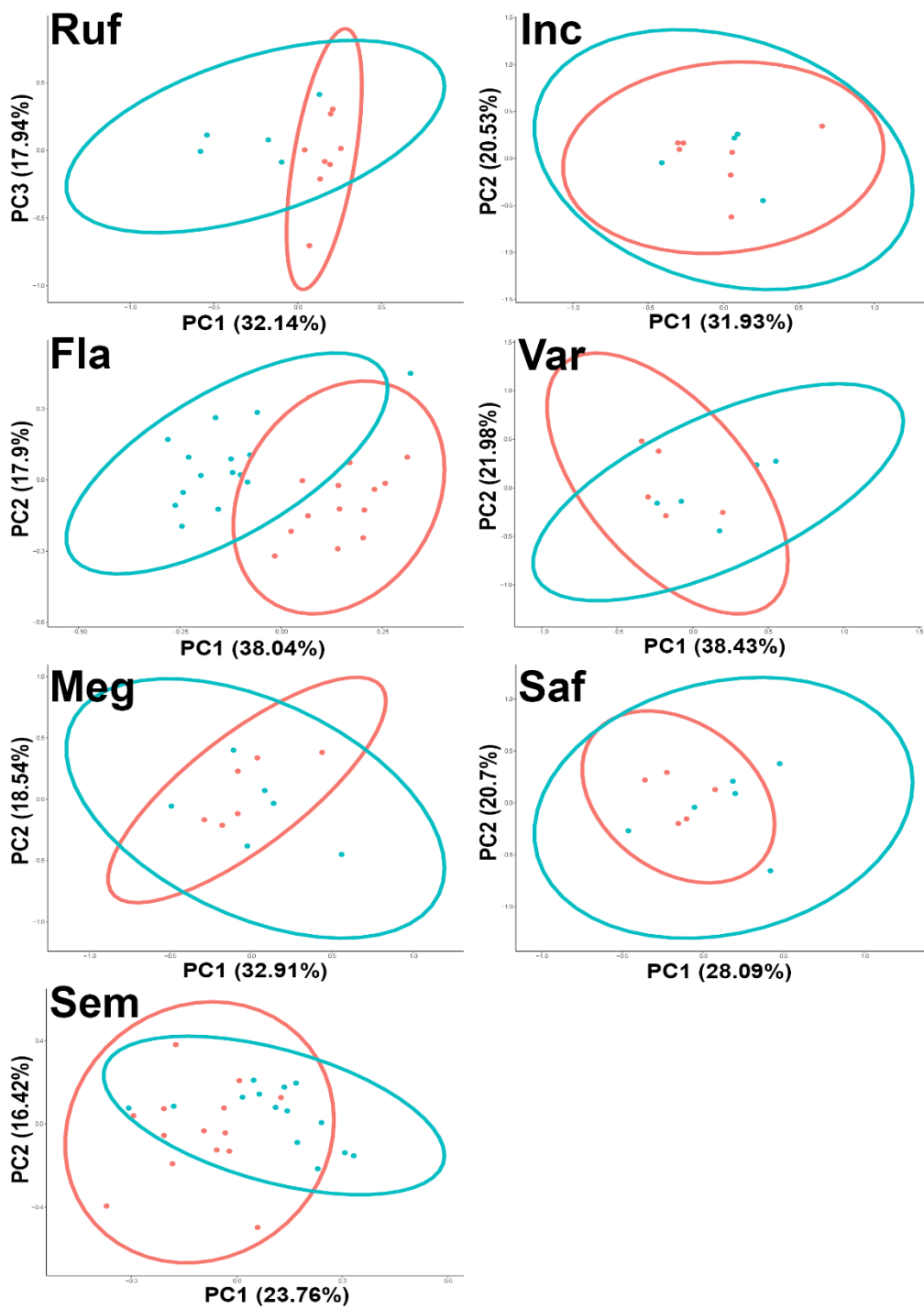


Figure S5. PCA plots of sex-specific differences in the CIELab average colour contrast of WIPs (mean L, A and B values). The blue dots and ellipses represent males, while red dots and ellipses represent females.

Table S3. a) Cumulative variances of principal components 1 – 5 from the blowfly colour dataset, that were used in ANOVA analysis to assess the differences in WIPs between the sexes of *Chrysoma* species. The output of ANOVA is also presented. Numbers in bold represent significant values.

Species (<i>Calliphora</i>)	-	PC1	PC2	PC3	PC4	PC5
Ruf	Cumulative variance (%)	59.27	78.37	93.54	97.72	99.23
	<i>F</i> _{1,11}	13.688	0.7813	0.0419	0.0167	3.6987
	<i>P</i>	0.003503	0.3957	0.8415	0.8996	0.08071
Inc	Cumulative variance (%)	46.13	71.84	84.44	95.69	98.77
	<i>F</i> _{1,9}	0.49	1.4005	2.0142	0.5098	2.9931
	<i>P</i>	0.5016	0.2669	0.1895	0.4933	0.1177
Fla	Cumulative variance (%)	53.2	76.69	91.64	95.38	97.57
	<i>F</i> _{1,27}	94.377	0.4477	0.3072	1.6691	0.3961
	<i>P</i>	2.63E-10	0.5091	0.584	0.2073	0.5344
Var	Cumulative variance (%)	56.96	77.02	88.39	94.06	97
	<i>F</i> _{1,8}	1.5248	0.011	0.0599	2.4854	1.6594
	<i>P</i>	0.2519	0.9189	0.8128	0.1536	0.2337
Meg	Cumulative variance (%)	42.67	66.42	82.98	96.55	99.12
	<i>F</i> _{1,10}	0.7832	0.2662	2.6287	0.438	5.9649
	<i>P</i>	0.3969	0.6171	0.136	0.5231	0.03471
Saf	Cumulative variance (%)	39.45	60.31	77.24	93.24	98.45
	<i>F</i> _{1,9}	1.6813	2.4974	2.767	0.0154	0.0997
	<i>P</i>	0.227	0.1485	0.1306	0.9038	0.7594
Sem	Cumulative variance (%)	48.87	67.73	82.09	89.04	93.93
	<i>F</i> _{1,26}	3.7301	3.1037	0.0804	1.1231	5.6487
	<i>P</i>	0.06441	0.08987	0.7791	0.299	0.02512

Table S3. b) The top five variables from the blowfly colour dataset that contributed significantly to the principal components. Contribution of variables was assessed using the function ‘fviz_contrib’ of the R package ‘factoextra’.

Species	PC	Contributing variable	Wing Section
<i>Ch. flavifrons</i>	1	Rh5	E
		Rh1	E
		Rh1	Wing
		Rh5	Wing
		Rh6	E
<i>Ch. rufifacies</i>	1	Rh1	B
		Rh6	B
		Rh5	B
		Rh6	Wing
		Rh1	Wing
<i>Ch. megacephala</i>	5	Rh6	C
		Rh5	B

		Rh5	A
		Rh1	B
		Rh5	D
<i>Ch. semimetallica</i>	5	Rh6	B
		Rh1	B
		Rh5	C
		Rh1	C
		Rh5	B

Table S4. a) Cumulative variances of principal components 1 – 5 from the blowfly colour contrast dataset, that were used in ANOVA analysis to assess the differences in WIPs between the sexes of *Chrysoma* species. The output of ANOVA is also presented. Numbers in bold represent significant values.

Species (Calliphora)	-	PC1	PC2	PC3	PC4	PC5
Ruf	Cumulative variance (%)	61.34	80.79	93.22	97.78	99.17
	<i>F</i> _{1,11}	14.202	1.9241	0.039	3.4238	0.0259
	<i>P</i>	0.003108	0.1929	0.847	0.09914	0.875
Inc	Cumulative variance (%)	54.03	76.79	88.52	95.09	97.47
	<i>F</i> _{1,9}	0.2679	0.4512	0.3119	0.0018	2.3449
	<i>P</i>	0.6172	0.5186	0.5902	0.9667	0.1601
Fla	Cumulative variance (%)	49.16	69.78	81.97	89	92.62
	<i>F</i> _{1,27}	20.712	25.799	0.0239	0.0527	0.0461
	<i>P</i>	0.0001017	2.46E-05	0.8782	0.8201	0.8315
Var	Cumulative variance (%)	41.55	71.01	82.79	90.17	95.49
	<i>F</i> _{1,8}	16.985	0.3321	0.9219	0.2024	0.7569
	<i>P</i>	0.003339	0.5083	0.3651	0.6647	0.4088
Meg	Cumulative variance (%)	46.15	74.62	89.29	94.89	98.7
	<i>F</i> _{1,10}	0.1532	1.3602	3.5836	0.4455	0.7338
	<i>P</i>	0.7037	0.2706	0.08762	0.5196	0.4117
Saf	Cumulative variance (%)	41.01	61.42	81.43	91.4	95.92
	<i>F</i> _{1,9}	1.4182	0.9643	1.3615	0.5976	0.011
	<i>P</i>	0.2642	0.3518	0.2733	0.4593	0.9186
Sem	Cumulative variance (%)	53.8	67.31	80.01	87.23	91.2
	<i>F</i> _{1,26}	17.254	2.9485	1.7786	0.0101	0.3729
	<i>P</i>	0.00003127	0.09785	0.1939	0.9208	0.5467

Table S4. b) The top five variables from the blowfly colour contrast dataset that contributed significantly to the principal components. Contribution of variables was assessed using the function ‘fviz_contrib’ of the R package ‘factoextra’.

Species	PC	Contributing variable	Wing Section
<i>Ch. flavifrons</i>	1	Rh1	C
		Rh1	B
		Rh6	C

		Rh5	B
		Rh5	C
	2	Rh6	D
		Rh6	Wing
		Rh5	D
		Rh6	A
		Rh5	E
<i>Ch. rufifacies</i>	1	Rh1	B
		Rh6	B
		Rh6	Wing
		Rh1	Wing
		Rh5	B
<i>Ch. varipes</i>	1	Rh1	Wing
		Rh6	B
		Rh1	B
		Rh6	Wing
		Rh1	E
<i>Ch. semimetallica</i>	1	Rh5	B
		Rh1	B
		Rh6	C
		Rh1	C
		Rh1	D

Table S5. a) Cumulative variances of principal components 1 – 5 from the CIELab colour dataset, that were used in ANOVA analysis to assess the differences in WIPs between the sexes of *Chrysoma* species. The output of ANOVA is also presented. Numbers in bold represent significant values.

Species (CIELab)	-	PC1	PC2	PC3	PC4	PC5
Ruf	Cumulative variance (%)	32.14	55	72.93	84.5	92.44
	<i>F</i> _{1,11}	14.109	0.013	1.1298	0.8213	0.3927
	<i>P</i>	0.003176	0.9113	0.3106	0.3842	0.5437
Inc	Cumulative variance (%)	31.93	52.46	71.55	83.3	93.45
	<i>F</i> _{1,9}	0	0.0109	2.6286	1.0388	4.7262
	<i>P</i>	0.9952	0.919	0.1394	0.3347	0.05774
Fla	Cumulative variance (%)	38.04	55.95	70.43	82.22	88.8
	<i>F</i> _{1,27}	36.351	4.9144	0.4727	2.7435	1.2737
	<i>P</i>	1.96E-06	0.03524	0.4976	0.1092	0.269
Var	Cumulative variance (%)	38.43	60.41	80.62	88.16	93.49
	<i>F</i> _{1,8}	3.6538	0.1869	2.2759	2.2981	0.114
	<i>P</i>	0.09232	0.6769	0.1698	0.168	0.7443
Meg	Cumulative variance (%)	32.91	51.45	69.14	81.49	90
	<i>F</i> _{1,10}	0.0892	0.7994	0.9076	0.0367	0.037
	<i>P</i>	0.7712	0.3923	0.3632	0.8519	0.8513
Saf	Cumulative variance (%)	28.09	48.79	65.73	82.07	91.35

	<i>F</i> _{1,9}	2.7562	0.3101	0.3086	4.736	1.3029
	<i>P</i>	0.1312	0.5912	0.5921	0.05753	0.2832
	Cumulative variance (%)	23.76	40.18	53.96	67.12	76.89
Sem	<i>F</i> _{1,26}	12.535	0.2643	0.4679	0.4679	0.4383
	<i>P</i>	0.00153	0.2642	0.4679	0.4383	0.1629

Table S5. b) The top five variables from the CIELab colour dataset that contributed significantly to the principal components. Contribution of variables was assessed using the function ‘fviz_contrib’ of the R package ‘factoextra’.

Species	PC	Contributing variable	Wing Section
<i>Ch. flavifrons</i>	1	B	Wing
		B	A
		B	B
		B	E
		L	E
	2	A	Wing
		B	D
		L	B
		B	E
		A	B
<i>Ch. rufifacies</i>	1	L	B
		B	B
		L	Wing
		B	E
		B	C
<i>Ch. semimetallica</i>	1	B	C
		B	E
		B	D
		B	B
		A	E

Table S6. a) Cumulative variances of principal components 1 – 5 from the CIELab colour contrast dataset, that were used in ANOVA analysis to assess the differences in WIPs between the sexes of *Chrysoma* species. The output of ANOVA is also presented. Numbers in bold represent significant values.

Species (CIELab)	-	PC1	PC2	PC3	PC4	PC5
Ruf	Cumulative variance (%)	42.31	65.09	79.39	86.94	91.4
	<i>F</i> _{1,11}	5.1646	0.0309	0.7712	3.8139	0.3058
	<i>P</i>	0.04411	0.8636	0.3986	0.07674	0.5913
Inc	Cumulative variance (%)	46.31	66.83	82.63	88.76	93.64
	<i>F</i> _{1,9}	0.8551	1.4801	0.1619	3.9265	0.0192
	<i>P</i>	0.3792	0.2546	0.6968	0.07886	0.8928
Fla	Cumulative variance (%)	42.8	62.63	74.35	81.84	87.01

	<i>F</i> _{1,27}	13.304	7.2756	0.0259	5.2265	4.8251
	<i>P</i>	0.001116	0.0119	0.8734	0.03031	0.03861
Var	Cumulative variance (%)	47.72	65.67	80.39	88.07	92.56
	<i>F</i> _{1,8}	13.459	0.8668	0.2908	0.2954	0.9589
	<i>P</i>	0.006322	0.8668	0.2908	0.2954	0.9589
Meg	Cumulative variance (%)	32.53	53.44	67	79.61	88.08
	<i>F</i> _{1,10}	6.3463	2.2419	0.3124	0.259	0.3228
	<i>P</i>	0.03043	0.1652	0.5885	0.6218	0.5825
Saf	Cumulative variance (%)	34.24	57.05	68.81	79.63	87.26
	<i>F</i> _{1,9}	7.7448	0.0857	0.3196	0.2323	1.9014
	<i>P</i>	0.0213	0.7763	0.5856	0.6413	0.2012
Sem	Cumulative variance (%)	40.33	63.7	73.3	80.29	86.65
	<i>F</i> _{1,26}	7.1634	4.6796	0.7039	0.2001	0.6233
	<i>P</i>	0.01271	0.0399	0.4091	0.6584	0.4369

Table S6. b) The top five variables from the CIELab colour contrast dataset that contributed significantly to the principal components. Contribution of variables was assessed using the function ‘fviz_contrib’ of the R package ‘factoextra’.

Species	PC	Contributing variable	Wing Section
<i>Ch. flavifrons</i>	1	B	Wing
		B	A
		B	D
		B	B
		B	C
	2	L	E
		L	B
		L	C
		A	C
		A	A
<i>Ch. varipes</i>	1	B	D
		A	C
		B	Wing
		B	A
		L	B
<i>Ch. rufifacies</i>	1	A	Wing
		A	B
		L	C
		B	Wing
		B	C
<i>Ch. megacephala</i>	1	A	Wing
		A	A
		B	D
		A	C
		A	D

<i>Ch. saffrana</i>	1	A A A B L	B A D D B
<i>Ch. semimetallica</i>	1	B A B A A	A B D C D
	2	L B L L B	B E D C C