Myrmecological News

myrmecologicalnews.org

Myrmecol. News 31

Digital supplementary material

Digital supplementary material to

BUXTON, J.T., ROBERT, K.A., MARSHALL, A.T., DUTKA, T.L. & GIBB, H. 2021: A cross-species test of the function of cuticular traits in ants (Hymenoptera: Formicidae). – Myrmecological News 31: 31-46.

The content of this digital supplementary material was subject to the same scientific editorial processing as the article it accompanies. However, the authors are responsible for copyediting and layout.

Table S1: Eigenvalues and eigenvectors from the principal component analysis of ant traits. Variables contributing meaningfully to each axis are presented in bold type.

Variable	PC1	PC2	PC3
Eigenvalues	2.5	1.8	1.4
%Variation	25.1	17.5	13.5
Cum.%Variation	25.1	42.7	56.2
Eye length (residuals)	0.29	0.16	0.22
Scape length (residuals)	-0.25	**-0.38**	-0.25
Weber's length	**0.32**	**-0.52**	0.09
Pronotum width (residuals)	**0.39**	0.25	**-0.41**
Pilosity	**0.43**	-0.09	-0.25
Hair colour score	-0.20	0.03	**-0.45**
Pubescence score	-0.05	**-0.52**	-0.19
Pronotum sculpturing score	**0.45**	0.11	0.24
Mass-independent water loss rate	**-0.41**	0.21	**0.32**
CT_{max}	0.07	**0.41**	**-0.50**

Table S2. Species means for traits data used in this study.

Subfamily	Morphospecies	Species code	Location	Activity	Scape length (mm)	Eye length (mm)	Webers length (mm)	Pronotum width (mm)	Pilosity	Greatest hair length (mm)	Hair colour score	Pubescence score	Pronotum sculpturing score	Overall sculpturing score	Frequency of sculpturing units	Area of single sculpturing unit (mm^2)	proportion of depressions	Proportion of ridges	Cuticle thickness (um)	Mass independent water loss rate ($mg.hr^{-1}$)	CTmax (°C)	Proportion water content	Force to puncture (mN)	Adhesion energy (dynes/cm)	Dry mass (mg)	PC1	PC2	PC3
Cerapachinae	Cerapachys clarki group sp.1	Cer.sp1	Scotia	diurnal	0.84	0.27	2.05	0.94	37.6	0.33	1.5	1	2.0	2.1	89.0	1.7E-04	0.59	0.41	31.8	0.017	52.0	0.56	491.4	0.069	2.78	-0.97	-2.23	0.13
Dolichoderinae	Iridomyrmex brunneus sp.1	Iri.br.sp1	Scotia	diurnal	0.74	0.18	0.98	0.45	9.2	0.07	3.0	2	1.4	1.4	162.5	5.5E-05	0.60	0.53		0.171	50.0	0.82			0.11	2.68	-0.81	0.76
Dolichoderinae	Iridomyrmex exsanguis	Iri.ex	Scotia	nocturnal	0.81	0.19	1.05	0.45	11.2	0.04	1.5	1	1.4	1.4	170.0	5.1E-05	0.60	0.40		0.082	44.0	0.68			0.15	1.25	0.14	-1.46
Dolichoderinae	Iridomyrmex lividus	Iri.li	Scotia	diurnal	1.71	0.29	2.66	1.24	109.8	0.27	3.0	3	1.4	1.4	159.0	5.0E-05	0.58	0.42	18.5	0.051	49.6	0.70	279.7	0.065	2.54	0.13	1.07	2.74
Dolichoderinae	Iridomyrmex purpureus sp.1	Iri.pu	Scotia	diurnal	1.89	0.28	3.00	1.22	89.2	0.21	3.0	3	1.4	1.4	158.8	6.7E-05	0.60	0.40	25.5	0.042	51.0	0.67	269.4	0.093	3.03	0.57	1.09	2.82
Dolichoderinae	Iridomyrmex rufoniger group sp.2	Iri.gr.sp2	Scotia	diurnal	0.88	0.17	1.28	0.56	22.0	0.17	1.5	3	1.4	1.4	144.0	6.9E-05	0.53	0.47	10.8	0.115	47.0	0.69			0.39	1.56	0.63	-0.40
Dolichoderinae	Iridomyrmex sp. 2	Iri.sp2	Scotia	diurnal	0.63	0.14	0.72	0.38	4.0	0.05	1.5	2	1.4	1.4	125.0	5.4E-05	0.69	0.31		0.119		0.62			0.13			
Dolichoderinae	Iridomyrmex sp. 7	Iri.sp7	Scotia	diurnal	1.06	0.20	1.51	0.63	27.0	0.15	1.5	3	1.4	1.4	125.0	6.5E-05	0.49	0.51		0.060	47.2	0.52			0.86	1.07	1.02	0.07
Dolichoderinae	Ochetellus sp. 1	Och.sp1	LTU	diurnal	0.46	0.28	0.88	0.43	0.0	0.03	1.8	2	2.0	2.3	130.0	6.7E-05	0.45	0.55	20.6	0.028	50.0	0.71			0.13	-0.43	-1.68	-0.53
Dolichoderinae	Papyrius sp. 1	Pap.sp1	LTU	nocturnal	0.69	0.15	1.23	0.48	32.2	0.18	2.0	3	1.2	1.2	115.0	7.7E-05	0.49	0.51		0.060	45.2	0.69			0.32	1.18	0.91	-0.34
Dolichoderinae	Iridomyrmex sp. 1	Iri.sp1	LTU	diurnal	0.98	0.19	1.32	0.52	21.8	0.04	1.3	3	1.4	1.4	160.0	7.2E-05	0.42	0.58		0.066	48.8	0.68			0.28	1.30	0.76	0.03
Dolichoderinae	Iridomyrmex sp. 2	Iri.sp2	LTU	diurnal	0.81	0.17	1.24	0.57	24.0	0.12	1.8	3	1.4	1.4	118.0	4.6E-06	0.77	0.23			49.8							
Dolichoderinae	Iridomyrmex sp. 3	Iri.sp3	LTU	diurnal	1.14	0.20	1.61	0.73	70.2	0.15	1.5	3	1.4	1.4	168.0	1.5E-04	0.44	0.56		0.040	47.6	0.71			0.45	0.34	1.18	0.79
Dolichoderinae	Iridomyrmex sp. 4	Iri.sp4	LTU	diurnal	0.74	0.16	1.15	0.55	16.8	0.09	1.3	3	1.3	1.5	150.0	2.3E-05	0.43	0.57		0.072	48.6	0.72			0.33	1.03	0.19	0.06
Dolichoderinae	Iridomyrmex sp. 5	Iri.sp5	LTU	diurnal	0.90	0.20	1.52	0.64	2.5	0.06	1.0	3	1.2	1.2	70.0	7.1E-05	0.62	0.38		0.041	47.6	0.69			0.44	0.82	0.53	-0.52
Dolichoderinae	Iridomyrmex sp. 6	Iri.sp6	LTU	nocturnal	1.11	0.25	1.40	0.56	9.8	0.05	1.0	2.5	1.4	1.4	72.0	9.4E-05	0.42	0.58		0.039	46.8	0.68			0.34	0.90	0.97	-0.62
Ectatomminae	Rhytidoponera maniae	Rhy.ma	Scotia	diurnal	2.19	0.39	3.22	1.18	0.0	0.05	1.0	3	3.0	3.0	19.3	6.5E-05	0.19	0.81	70.2	0.044	46.2	0.57	1310.7	0.114	7.33	-0.16	1.64	-1.21
Ectatomminae	Rhytidoponera metallica group sp.1	Rhy.gr.sp1	Scotia	diurnal	1.17	0.22	1.86	1.01	23.3	0.23	1.5	1	3.0	3.0	30.0	3.5E-03	0.67	0.33	71.5	0.068	47.2	0.53	962.8	0.107	2.22	-0.43	-0.83	-0.56
Ectatomminae	Rhytidoponera near mayri sp.1	Rhy.ma.sp1	Scotia	diurnal	2.72	0.46	4.19	1.54	16.8	0.09	2.0	1	3.0	3.0	10.0	1.3E-02	0.68	0.32	62.7	0.015	46.0	0.55		0.031	16.77	-0.63	0.91	-0.53
Ectatomminae	Rhytidoponera sp. 1	Rhy.sp1	LTU	diurnal	0.72	0.18	1.39	0.72	31.0	0.20	1.2	2	3.0	3.0	12.0	5.0E-03	0.67	0.33	34.7	0.034	44.0	0.55	452.5		0.93	-1.16	-0.17	-1.58
Ectatomminae	Rhytidoponera sp. 2	Rhy.sp2	LTU	diurnal	1.11	0.21	1.77	0.95	18.6	0.18	2.5	2	3.0	3.0	12.0	4.0E-03	0.50	0.50	40.5	0.035	48.0	0.57			1.76	-0.17	-0.22	0.80
Ectatomminae	Rhytidoponera sp. 4	Rhy.sp4	LTU	nocturnal	1.16	0.24	2.00	1.04	27.4	0.22	1.5	2	3.0	3.0	14.0	6.0E-03	0.50	0.50		0.037	46.0	0.54			2.47	-0.86	0.02	-0.57

Subfamily	Morphospecies	Species code	Location	Activity	Scape length (mm)	Eye length (mm)	Webers length (mm)	Pronotum width (mm)	Pilosity	Greatest hair length (mm)	Hair colour score	Pubescence score	Pronotum sculpturing score	Overall sculpturing score	Frequency of sculpturing units	Area of single sculpturing unit (mm^2)	proportion of depressions	Proportion of ridges	Cuticle thickness (um)	Mass independent water loss rate ($mg.hr^{-1}$)	CTmax (°C)	Proportion water content	Force to puncture (mN)	Adhesion energy (dynes/cm)	Dry mass (mg)	PC1	PC2	PC3
Formicinae	Calomyrmex purpureus	Cal.pu	Scotia	diurnal	1.75	0.37	2.54	1.57	103.0	0.43	1.0	1	2.0	2.0	85.0	1.9E-04	0.65	0.35	14.3	0.025	50.5	0.73	319.8		3.58	-1.76	-0.71	1.16
Formicinae	Camponotus aeneopilosus	Cam.ae	LTU	diurnal	1.58	0.26	2.29	1.18	14.0	0.33	2.5	3	1.8	1.8	121.0	1.7E-04	0.52	0.48	11.6	0.033	48.0	0.70		0.030	2.07	0.69	1.05	1.56
Formicinae	Camponotus lownei	Cam.lo	LTU	nocturnal	1.11	0.29	1.68	0.84	38.5	0.42	2.0	2	2.0	2.0	81.0	6.7E-04	0.63	0.37		0.056		0.74			0.81			
Formicinae	Camponotus sp. 2	Cam.sp2	LTU	nocturnal	1.85	0.36	2.67	1.15	7.2	0.29	2.9	2	1.6	1.6	88.0	3.1E-04	0.47	0.53	12.5	0.034	45.8	0.71		0.091	1.87	0.93	1.08	0.82
Formicinae	Camponotus sp. 3	Cam.sp3	LTU	diurnal	1.60	0.31	2.39	0.97	6.5	0.30	2.0	2	1.6	1.6	122.5	2.3E-04	0.59	0.41		0.032	45.2	0.72			1.86	0.74	1.06	-0.20
Formicinae	Camponotus sp. 4	Cam.sp4	LTU	nocturnal	2.65	0.48	3.91	1.64	22.8	0.44	2.5	2.5	2.0	2.0	93.0	2.4E-04	0.46	0.54		0.019	46.0	0.69			9.37	0.02	1.83	0.74
Formicinae	Camponotus sp. 5	Cam.sp5	LTU	nocturnal	1.72	0.43	3.34	1.74	15.0	0.34	3.0	3	1.8	1.8	70.0	2.4E-04	0.58	0.42			46.0		255.9					
Formicinae	Camponotus eppiphium	Cam.ep	Scotia	diurnal	2.11	0.31	3.07	1.46	74.0	0.44	1.5	3	1.4	1.5	117.5	1.1E-04	0.67	0.33		0.063	47.7	0.71	284.5	0.073	3.08	0.10	1.55	1.00
Formicinae	Camponotus gouldianus	Cam.go	Scotia	nocturnal	2.90	0.42	4.66	1.81	86.8	0.53	1.0	1	1.4	1.4	95.0	2.6E-04	0.63	0.37		0.031	48.0	0.76	486.4	0.085	5.72	-0.81	0.95	0.12
Formicinae	Camponotus near aurocintus sp.1	Cam.au.sp1	Scotia	diurnal	2.62	0.46	3.73	1.65	25.1	0.34	1.5	3	1.4	1.4	116.0	1.9E-04	0.63	0.00		0.061	47.5	0.66	286.8	0.027	6.55	0.40	1.70	0.42
Formicinae	Camponotus near claripes group sp.1	Cam.cl.sp1	Scotia	nocturnal	1.59	0.36	2.11	0.87	5.2	0.17	2.0	2	1.4	1.4	123.5	1.1E-04	0.66	0.34		0.045	46.3	0.78			0.97	0.99	0.87	-0.02
Formicinae	Camponotus near tricoloratus sp.1	Cam.tr.sp1	Scotia	nocturnal	2.13	0.46	3.53	1.63	32.4	0.43	1.5	1	1.2	1.3	82.0	2.5E-04	0.54	0.46	10.2	0.017	47.0	0.72	342.0	0.078	10.74	-0.42	0.25	0.03
Formicinae	Camponotus nigriceps	Cam.ni	Scotia	nocturnal	2.89	0.67	4.58	2.02	40.2	0.55	2.0	1	1.4	1.4	102.5	1.7E-04	0.57	0.43	15.9	0.025	45.3	0.64	266.8	0.062	17.97	-0.67	1.01	-0.06
Formicinae	Camponotus whitei	Cam.wh	Scotia	diurnal	1.41	0.26	2.14	1.09	64.0	0.31	1.0	1	3.0	3.0	30.0	8.1E-04	0.54	0.46			48.0							
Formicinae	Melophorus JDM 472	Mel.JD	Scotia	diurnal	1.01	0.17	1.24	0.60	76.7	0.13	1.5	3	1.4	1.4	107.5	8.2E-05	0.50	0.50	5.9	0.036	50.7	0.75		0.053	0.28	0.51	0.78	1.76
Formicinae	Melophorus sp. 1	Mel.sp1	LTU	diurnal	0.91	0.18	1.16	0.59	11.0	0.12	2.0	1.5	1.6	1.6	92.0	2.0E-04	0.56	0.44	7.5	0.039	53.4	0.66			0.49	1.13	-1.06	1.80
Formicinae	Melophorus tuneri perthensis	Mel.tu	Scotia	diurnal	0.99	0.17	1.22	0.69	3.6	0.09	1.5	3	1.5	1.8	87.0	1.3E-04	0.41	0.59										
Formicinae	Melophorus turneri group sp.1	Mel.tu.sp1	Scotia	diurnal	0.81	0.16	1.09	0.54	6.2	0.08	1.5	2	1.4	1.4	150.0	8.5E-05	0.63	0.37		0.081		0.72			0.39			
Formicinae	Notoncus ectatommoides sp.1	Not.ec.sp1	Scotia	diurnal	1.12	0.26	1.83	0.92	27.0	0.29	1.5	1	2.7	2.7	50.0	2.0E-03	0.53	0.12		0.053		0.79			1.11			
Formicinae	Polyrhachis schwieldandi group sp.1	Pol.sc.sp1	Scotia	nocturnal	1.56	0.33	2.46	1.47	4.5	0.07	1.5	1.4	2.9	2.9	43.3	2.1E-02	0.62	0.26	24.3	0.013	48.3	0.67	376.9	0.007	5.20	-1.05	-0.54	0.16
Formicinae	Polyrhachis sp. 1	Pol.sp1	LTU	diurnal	2.05	0.36	2.67	1.39	0.0	0.03	1.0	3	3.0	3.0	70.0	1.6E-02	0.48	0.52	22.7	0.019	46.0	0.61	390.9	0.094	6.01	-0.68	1.50	-0.38
Formicinae	Stigmacros sp. 1	Sti.sp1	LTU	diurnal	0.52	0.10	0.78	0.40	0.0	0.01	2.0	2	1.8	1.9	120.0	2.3E-04	0.74	0.26		0.075	47.3	0.74			0.08	1.38	-0.31	0.01
Formicinae	Prolasius sp. 1	Pro.sp1	LTU	nocturnal	0.80	0.13	1.01	0.48	2.0	0.11	3.0	2	1.0	1.0	0.0	0.0E+00	0.00	0.00		0.102	44.4	0.79			0.18	2.64	0.85	0.50
Myrmeciinae	Myrmecia desertorum	Myr.de	Scotia	nocturnal	4.18	1.16	6.93	2.09	82.0	0.34	1.5	2	2.8	2.9	9.9	1.8E-02	0.83	0.17	51.2	0.053	45.6	0.58	542.1	0.095	28.69	-2.06	2.31	-1.34
Myrmeciinae	Myrmecia piliventris sp.1	Myr.pi	LTU	diurnal	1.64	0.58	3.36	1.52	92.8	0.46	1.0	3	3.0	3.0	16.0	3.8E-02	0.74	0.26		0.014	48.0	0.60		0.080	7.73	-2.79	0.44	-0.47
Myrmeciinae	Myrmecia pilosula group sp. 1 [LTU]	Myr.pi.sp1	LTU	diurnal	1.77	0.62	3.68	1.48	116.4	0.26	1.0	3	2.8	2.9	19.0	4.4E-02	0.75	0.25	27.9	0.021	46.0	0.63	515.7		8.71	-2.85	1.07	-0.93
Myrmeciinae	Myrmecia pilosula group sp.1	Myr.pi.sp1	Scotia	diurnal	2.27	0.71	4.28	1.86	57.3	0.42	1.5	1	3.0	3.0	16.3	5.1E-02	0.74	0.26		0.017		0.62			7.73			
Myrmeciinae	Myrmecia Pilosula group sp.2	Myr.pi.sp2	Scotia	diurnal	1.90	1.06	3.54	1.51	78.0	0.39	1.5	1	3.0	3.0	18.5	4.6E-02	0.69	0.31	25.2	0.032	44.0	0.63	446.3		6.70	-2.87	-0.09	-1.95

Subfamily	Morphospecies	Species code	Location	Activity	Scape length (mm)	Eye length (mm)	Webers length (mm)	Pronotum width (mm)	Pilosity	Greatest hair length (mm)	Hair colour score	Pubescence score	Pronotum sculpturing score	Overall sculpturing score	Frequency of sculpturing units	Area of single sculpturing unit (mm^2)	proportion of depressions	Proportion of ridges	Cuticle thickness (um)	Mass independent water loss rate ($mg.hr^{-1}$)	CTmax (°C)	Proportion water content	Force to puncture (mN)	Adhesion energy (dynes/cm)	Dry mass (mg)	PC1	PC2	PC3
Myrmeciinae	Myrmecia pilosula group sp.4	Myr.pi.sp4	Scotia	diurnal	1.79	0.57	3.69	1.35	27.0	0.28	1.5	1	3.0	3.0	21.0	4.3E-02	0.76	0.24			44.0			0.058	6.40			
Myrmeciinae	Myrmecia pilosula group sp.5	Myr.pi.sp5	Scotia	diurnal	1.73	0.55	3.46	1.44	77.3	0.29	1.5	1	3.0	3.0	19.7	4.2E-02	0.69	0.31		0.014	48.0	0.63				-2.30	-0.56	-0.63
Myrmeciinae	Myrmecia sp. 3	Myr.sp3	LTU	nocturnal	3.47	1.07	6.94	2.28	126.8	0.19	1.3	3	3.0	3.0	10.0	1.5E-02	0.74	0.26	48.1	0.038	42.0	0.60	548.2	0.092	26.42	-3.33	3.19	-1.81
Myrmicinae	Aphaenogaster sp.1	Aph.sp1	Scotia	diurnal	0.97	0.17	1.71	0.69	32.0	0.22	1.5	1	1.5	2.0	30.0	6.5E-04	0.21	0.00		0.293		0.74			0.46			
Myrmicinae	Crematogaster laeviceps group sp. 1	Cre.la.sp1	Scotia	nocturnal	0.67	0.14	1.04	0.53	83.2	0.17	1.5	1	1.0	1.6	0.0	0.0E+00	0.00	0.00	11.0	0.021	51.2	0.62			0.42	0.03	-1.13	1.31
Myrmicinae	Crematogaster sp. 1	Cre.sp1	LTU	diurnal	0.69	0.16	1.01	0.57	21.6	0.19	2.0	2	1.0	2.3	0.0	0.0E+00	0.00	0.00		0.085	46.8	0.61			0.55	1.22	-0.17	0.32
Myrmicinae	Meranoplus D group sp.1	Mer.D.sp1	Scotia	diurnal	0.26	0.14	0.57	0.60	72.5	0.09	1.5	1	3.0	3.0	23.5	1.0E-03	0.47	0.53		0.035	50.7	0.57			0.14	-3.00	-3.52	0.41
Myrmicinae	Meranoplus similis	Mer.si	Scotia	diurnal	0.46	0.15	0.68	0.87	97.8	0.15	1.5	1	3.0	3.0	16.5	1.8E-03	0.50	0.50		0.031	48.8	0.57		0.045	0.38	-2.97	-2.16	1.37
Myrmicinae	Meranoplus sp. 1	Mer.sp1	LTU	diurnal	0.44	0.13	0.61	0.68	90.6	0.10	2.0	2	3.0	3.0	26.0	2.0E-04	0.50	0.50		0.051	50.0	0.58			0.22	-2.07	-1.60	1.92
Myrmicinae	Meranoplus sp.11	Mer.sp11	Scotia	diurnal	0.63	0.14	0.94	1.08	69.2	0.16	2.5	1	3.0	3.0	11.5	1.2E-02	0.93	0.07	28.2	0.025	48.0	0.64		0.111	0.66	-1.94	-1.66	2.04
Myrmicinae	Monomorium sordidum sp.1	Mon.so.sp1	Scotia	diurnal	0.38	0.08	0.61	0.22	10.2	0.08	1.5	1	1.0	2.1	0.0	0.0E+00	0.00	0.00		0.262	49.0	0.72			0.04	3.65	-1.82	-1.99
Myrmicinae	Monomorium sp. 1	Mon.sp1	LTU	diurnal	0.41	0.06	0.66	0.25	8.8	0.17	2.0	1.2	1.0	1.7	0.0	0.0E+00	0.00	0.00		0.101	49.7	0.69			0.06	2.74	-0.93	0.02
Myrmicinae	Monomorium sp. 2	Mon.sp2	LTU	nocturnal	0.85	0.16	1.56	0.74	38.8	0.24	1.5	1.2	1.0	1.6	0.0	0.0E+00	0.00	0.00	24.9	0.011	48.0	0.59		0.046	1.28	0.29	-0.55	0.34
Myrmicinae	Monomorium sp. 3	Mon.sp3	LTU	diurnal	0.31	0.05	0.48	0.20	9.4	0.06	1.5	1.2	1.0	2.2	0.0	0.0E+00	0.00	0.00		0.094	50.0	0.63			0.03	2.40	-1.09	-0.25
Myrmicinae	Pheidole b group [a]	Phe.B.sp1	Scotia	diurnal	0.36	0.09	0.54	0.28	15.6	0.07	1.5	1	2.8	2.8	140.0	1.0E-04	0.45	0.55		0.142	44.7	0.58			0.04	0.74	-1.12	-2.21
Myrmicinae	Pheidole b group [b]	Phe.B.sp2	Scotia	diurnal	0.37	0.09	0.54	0.27	13.8	0.06	1.5	1	2.8	2.8	70.0	5.6E-05	0.51	0.49		0.209	45.3	0.57			0.05	1.45	-1.43	-2.53
Myrmicinae	Pheidole b group [c]	Phe.B.sp3	Scotia	diurnal	0.36	0.08	0.51	0.27	14.3	0.06	1.5	1	2.8	2.8	85.0	1.0E-04	0.38	0.62		0.090	48.0	0.78			0.03	0.59	-1.29	-0.86
Myrmicinae	Pheidole sp. 1	Phe.sp1	LTU	diurnal	0.48	0.09	0.72	0.37	19.0	0.13	2.0	1	2.8	2.8	70.0	1.4E-04	0.58	0.42	11.2	0.092	45.3	0.66			0.09	0.67	-0.75	-0.94
Myrmicinae	Podomyrma adelaidae	Pod.ad	Scotia	diurnal	0.95	0.23	1.88	1.00	13.5	0.17	1.5	1	3.0	3.0	15.0	2.5E-02	0.83	0.17	27.5	0.040	50.0	0.67	553.3	0.074	1.34	-0.85	-1.79	-0.27

Figure S1. A demonstration of the method used to measure cuticle thickness (*Cerapachys clarki* group sp.1 depicted). The mean thickness of the cuticle was measured at five points along the dorsal part of the pronotum. Photo taken at 850x magnification. Scale bar = 10µm.

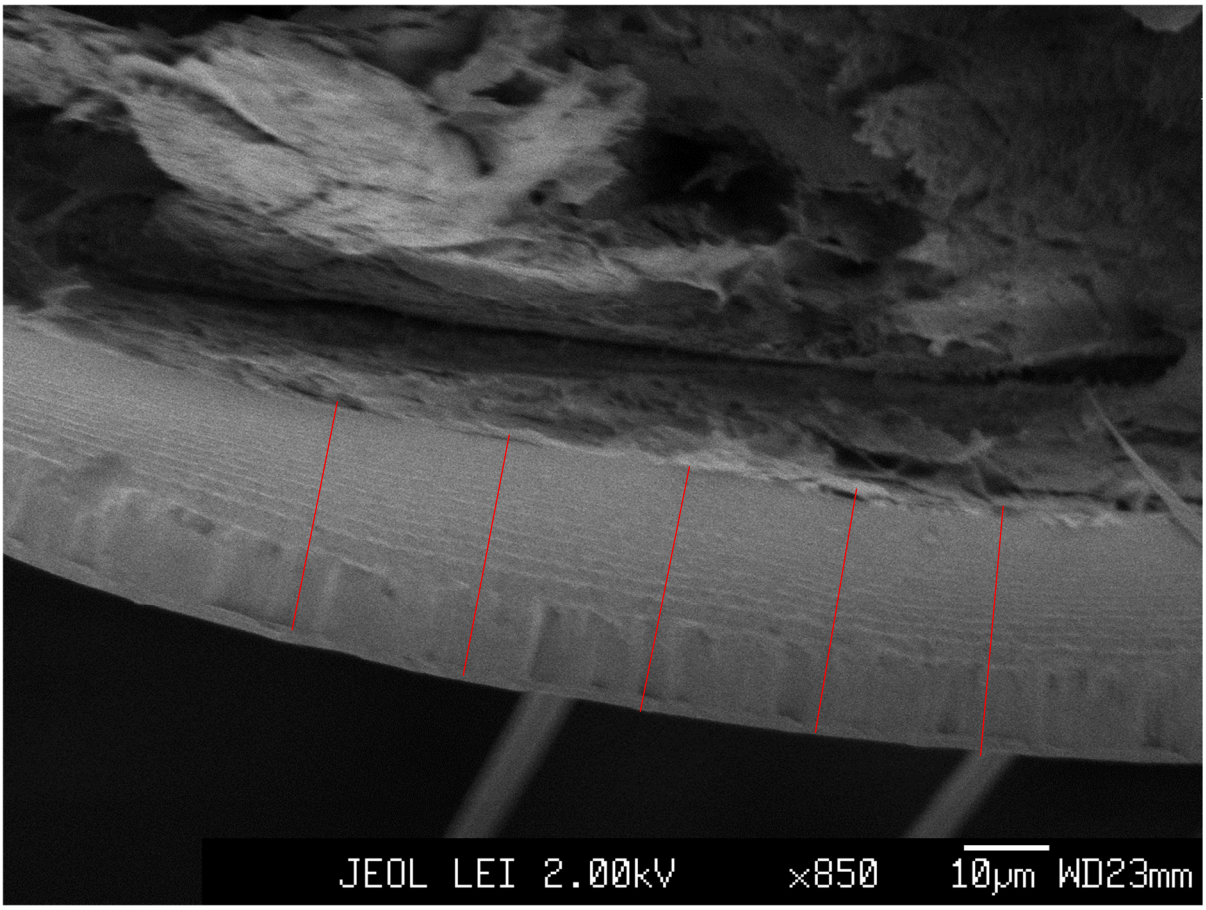

Figure S2: Stereo image of *Iridomyrmex lividus* cuticle at 1000x magnification. Scale bar = 10µm.

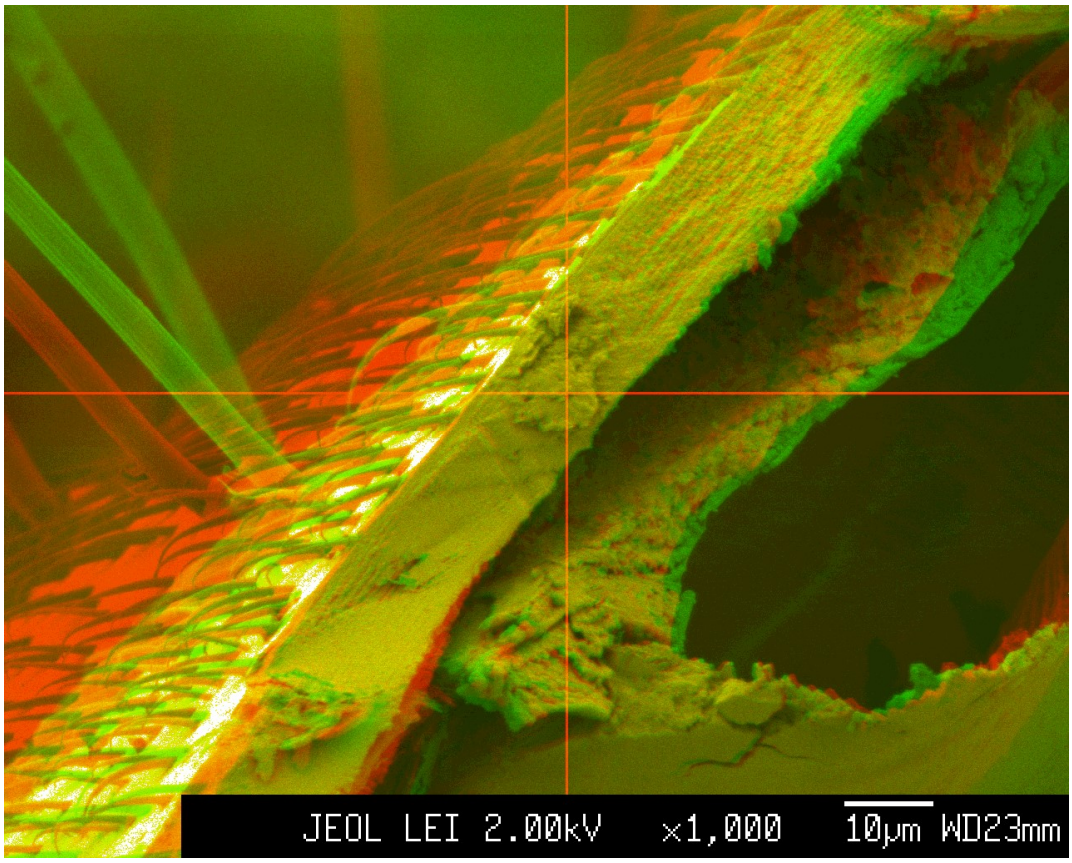

Figure S3: A typical recording of force to puncture in *Rhytidoponera metallica.* Force is progressively applied (indicated by upward pointing arrow) until the cuticle is punctured by the pin resulting in a rapid loss of force (indicated by downwards pointing arrow).

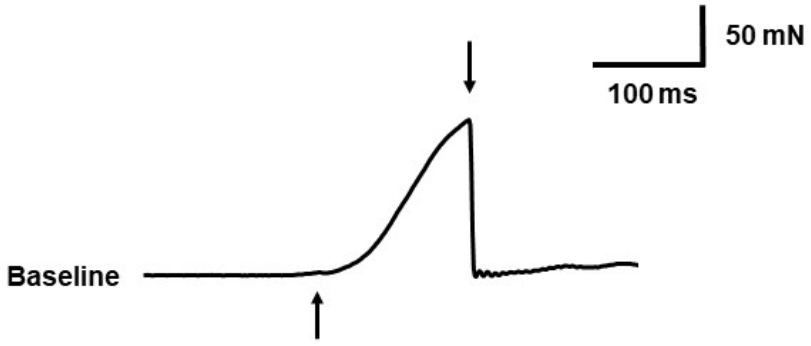
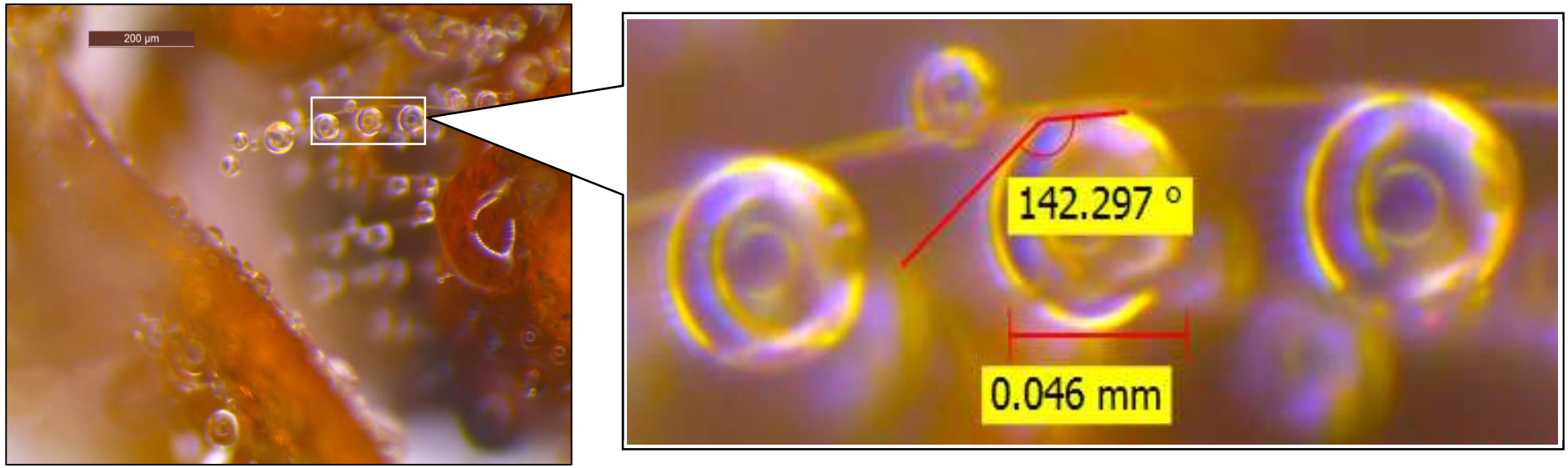
Figure S4. A demonstration of the method used to measure the hydrophobicity of hairs. Photograph depicts the contact angles of droplets on the psamnophore of *Melophorus* JDM472. Droplet size is small enough (< 0.3 mm) to render the effects of gravity on droplet formation negligible. Contact angles >90° indicate the surface is hydrophobic