

Supplementary material

Juan C. Alonso*, Luis M. Bautista & Javier A. Alonso 2019: Sexual size dimorphism in the Common Crane, a monogamous, plumage-monomorphic bird. — *Ornis Fennica* 96: 194–204.

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Supplementary Table 1. A review of published measurements of Common Cranes. Linear measurements in mm, weight in g.

	sex	This study			Witherby 1943 ^b <i>Grus g. grus</i>			Hartert 1921 (tail, <i>Grus g. grus</i> western Europe); Sudilovskaya 1951 (wing, tarsus, bill, <i>Grus g.</i> <i>grus</i> eastern Europe) ^d ; other authors (tail, subspecies not specified) ^e			Sudilovskaya 1951 (wing, <i>Grus g. lilfordi</i>)			Walkinshaw 1973 <i>Grus g. grus</i> (values cited also in Johnsgard 1983, combining both subspecies)			Walkinshaw 1973 <i>Grus g. lilfordi</i> (values cited also in Johnsgard 1983, combining both subspecies)		
		mean	min–max	<i>n</i>	mean	min–max	<i>n</i>	mean	min–max	<i>n</i>	mean	min–max	<i>n</i>	mean	min–max	<i>n</i>	mean	min–max	<i>n</i>
Wing arch	M	608.9	580.0–650.0	21				641	600–660	17	600	580–640	4						
	F	574.5	520.0–625.0	20		555–610	6	595	570–640	14	582	510–610	4						
Wing chord	M	559.5	530.0–600.0	21										547.6	507–597	8 ^f	547.9	512–608	12 ^k
	F	532.1	485.0–580.0	21										536	529–546	3 ^g	533.7	521–550	7 ^l
Tail length	M	214.3	195.0–230.0	21		190–220	6		220–230	^c				189.3	168–210	8	197.7	185–215	12
	F	202.9	190.0–220.0	21		103–113	^c							186.3	178–197	3			
Tarsus length	M	253.6	231.0–278.0	21		230–250	6	250	228–260	17				228.8	202–252	8	229.7	206–249	12
	F	244.0	220.0–268.0	21				228	220–238	14				224.3	205–238	3	219.7	201–242	7
Central toe length	M	99.9	95.0–108.5	21										110.0	98–123	8 ^h	97.2	84–106	12 ^h
	F	94.8	86.0–103.1	21										104.3	103–105	3 ^h	98.8	88–112	7 ^h
Head length	M	186.0	175.6–195.0	20															
	F	177.9	169.0–188.4	21															
Head width	M	44.6	42.2–46.8	21															
	F	42.9	41.0–45.0	21															
Bill length (culmen)	M	107.5	95.3–119.0	21		105–118	6	110	103–120	17				109.0	104–116	8	103.4	95–112	12
	F	103.9	95.8–112.5	21				102	100–110	14				107.3	104–113	3	98.7	96–104	7
Bill length (nostril)	M	77.6	68.5–84.8	21										77.3	71–84	8	77.2	69–81	12
	F	74.4	68.5–82.0	21													73	72–74	7
Bill height	M	31.8	30.0–34.6	21															
	F	31.0	27.3–34.6	21															
Weight ^a	M	5929	5250–6550	21					3950–7000	^c				5905		1 ⁱ			
	F	5150	4450–5800	21				4931	4355–5350	^c				5896		1 ^j			

	sex	Cramp & Simmons 1980 <i>Grus g.grus</i> western Europe (also in Cramp 2006, Storchová & Hořák 2018)			Cramp & Simmons 1980 <i>Grus g.lilfordi</i>			Markin & Krever 1995 ^f (also in Ilyashenko <i>et al.</i> 2008)			Winter <i>et al.</i> 2016 ^f <i>Grus g.grus</i>			Winter <i>et al.</i> 2016 ^f <i>Grus g.lilfordi</i>			Winter <i>et al.</i> 2016 ^f <i>Grus g.archibaldi</i>		
		mean	min– max	<i>n</i>	mean	min– max	<i>n</i>	mean ^s	min–max	<i>n</i>	mean	min–max	<i>n</i>	mean	min–max	<i>n</i>	mean	min–max	<i>n</i>
Wing arch	M	593 ^m	561–629	8															
	F	557	522–582	8															
Wing chord	M						551.9**	490–590	45	561	500–610	87	550.2	515–610	39	640	630, 650	2	
	F						533.5	484–605	35	539	484–605	99	526.2	490–560	38		610	1	
Tail length	M	210	202–225	8			213.6 ^{ns}	185–260	44	214.8	180–260	84	197.6	180–235	36	252	244, 260	2	
	F	200	189–215	8			209.7	190–240	34	204.6	170–245	91	190.3	165–222	35		220	1	
Tarsus length	M	258	240–275	11 ⁿ			258.5***	247–275	46	254.9	204–280	92	243.6	204–267	40	267.5	265, 270	2	
	F	238	211–256	16 ⁿ			235.8	210–247	35	238.5	205–266	100	233.0	210–250	42		255	1	
Central toe length	M	108	101–112	11 ^{n,o}			98.4***	91–105	46										
	F	98	88–106	16 ^{n,o}			92.7	85–97	34										
Head length	M																		
	F																		
Head width	M						43.3 ^{ns}	41–46	19										
	F						42.8	40–45	14										
Bill length (culmen)	M	109	100–119	11 ⁿ			106.7***	96–120	46	107.8	96–120	^t	105.4	95–117	^t	118.5	116, 121	2	
	F	102	97–108	14 ⁿ			102.1	94–111	35	102.4	94–112	^t	99.9	85–112	^t		107	1	
Bill length (nostril)	M						65.0**	53–75	46										
	F						62.3	55–69	35										
Bill height	M						29.8 ^{ns}	21–35	30										
	F						30.1	22–40	28										
Weight ¹	M	5750	5095–6100	3 ^p	4583	3000–5500	6 ^{p,q}	5700***	4700–6300	46									
	F	5186	4500–5895	4 ^p				5170	4600–6100	34									

^a this sample does not include a maximum weight of 7500 g of a crane that could not be sexed; ^b values for western Europe cited in Glutz *et al.* 1973; ^c sample size not mentioned; ^d values for eastern Europe cited in Glutz *et al.* 1973; ^e Glutz *et al.* 1973; ^f 3 birds from Sweden, 1 from Russia, 2 from Italy, 1 from Poland, 1 from Egypt; ^g birds from Ethiopia; ^h including claw; ⁱ bird from Sweden, September 1934; ^j bird from Sudan, December 1913; ^k 7 birds from China, 4 from India, 1 from Manchuria; ^l 4 birds from China, 2 from India, 1 from Manchuria; ^m not specified whether this is chord or arch; ⁿ measurements of bill, tarsus and central toe include an unspecified number of juvenile birds ("bill, tarsus and toe of juvenile similar to adult from late autumn or winter onwards; combined above"); ^o probably including claw (not specified by the author); ^p sex not specified; ^q same values cited later by Johnsgard 1983; ^r measurements from Martin & Krever (1995) were later integrated into a larger sample and published by Winter *et al.* (2016); ^s significance of male-female differences: ** p<0.01, *** p<0.001, ^{ns} not significant; ^t sample size not specified

Most of the previously published morphometric data shown in this Table S1 are from early- to mid-last-century skin collections. Their measurements are generally very similar to those of the present study. As for the comparison between the western (this study) and the eastern crane populations (Markin and Krever 1995; Winter *et al.* 2016; note that Winter *et al.*'s sample includes Markin and Krever's birds), we found no noteworthy differences. They averaged only 1.69% (range 0.33 – 6.71%) in males, and 1.03% (range 0.23 – 3.48%) in females when comparing with Markin and Krever's (1995) sample, and 0.32% (range 0.23 – 0.51%) in males, and 0.41% (range 0.83 – 2.31) in females when comparing with Winter *et al.*'s (2016) sample. In the Russian population sexes also differed significantly in weight, and in all linear measurements except tail length, head width, and bill height. Like in our sample, the highest SSD values were found in weight, central toe, and bill length. A remarkable dimorphism was also found in tarsus length (9.63% in Markin and Krever 1995, 6.88% in Winter *et al.* 2016). Apparently this was due to a much wider range in the length of tarsi in both Russian samples, but also to the surprising absence of any overlap between sexes in Markin and Krever's tarsus length measurements. Since sexing of Russian cranes was not done by molecular techniques, it is difficult to draw any conclusion from their figures.

References

- Cramp, S. 2006. The birds of the Western Palearctic interactive. Oxford University Press, Oxford.
- Cramp, S. & Simmons, K. E. L. 1980. The birds of the western Palearctic. Oxford University Press, Oxford.
- Glutz, U. N., Bauer, K. M. & Bezzel, E. 1973. Handbuch der Vögel Mitteleuropas. Akademische Verlagsgesellschaft, Frankfurt.
- Hartert, E. 1921. Die Vögel der Paläarktischen Fauna. R. Friedländer & Sohn, Berlin.
- Ilyashenko, E., Ghasabyan, M. & Markin, Y. 2008. Morphological variability of common crane *Grus grus*. In Cranes of Eurasia: biology, distribution, migrations. In Proceedings CWGE International Conference 2007 (ed. Ilyashenko, E., Kovshar, A. & Winter, S. V.): 51-83. Crane Working Group of Eurasia, Moscow. [in Russian]
- Johnsgard, P. A. 1983. Cranes of the world. Croom Helm, London & Canberra.
- Markin, Y. M. & Krever, V. 1995. Morphometric parameters of the Common Crane used in sex identification. In Crane Research and Protection in Europe (ed. Prange, H., Alonso, J. C. & Alonso, J. A.): 77-78. Martin-Luther Universität, Halle-Wittenberg.
- Storchová, L. & Hořák, D. 2018. Life-history characteristics of European birds. *Global Ecology And Biogeography* 27: 400-406.
- Sudilovskaya, A. M. 1951. Cranes. In *Birds of the Soviet Union*, vol. 2 (ed. Dementiev, G. P., Gladkov, N. A., Ptushenko, E. S., Spangenberg, E. P. & Sudilovskaya, A. M.): 297-138. Moskow. Sovetskaya Nauka. [in Russian]
- Walkinshaw, L. H. 1973. Cranes of the world. Winchester Press, New York.
- Winter, S. V., Markin, Y. M. & Kashentseva, T. A. 2016. Some phenotypic features of the Common Crane *Grus grus*. [in Russian]. *Russian Ornithological Journal* 25: 269-299.
- Witherby, H. F. 1943. The Handbook of British Birds. J & J Gray, Edinburgh.