

Appendices

Table S1. Details of the specimen used in this study, including raw jaw muscles data and PCSA and the outputs of the biomechanical model for all individuals.

[Click here to Download Table S1](#)

Table S2. Definition of the landmarks used in the geometric morphometric analyses following the Nomina Anatomica Veterinaria nomenclature (NAV, 2017).

Landmark	Definition
Lower jaw: Mandibula	
1	Most rostromedial point of the Synchondrosis intermandibularis, at the base of the first incisor tooth
2	Most rostral point of the canine tooth, on the lateral side
3	Most caudal point of the canine tooth, on the lateral side
4	Most rostral point of the second premolar tooth, on the lateral side
5	Most rostral point of the third premolar tooth, on the lateral side
6	Most rostral point of the fourth premolar tooth, on the lateral side
7	Most caudal point of the fourth premolar tooth, on the lateral side
8	Most caudal point of the carnassial tooth, on the lateral side
9	Most caudal point of the second molar tooth, on the lateral side
10	Highest point of the tip of the Processus coronoideus
11	Most caudal point of the tip of the Processus coronoideus
12	Most caudal point of the Incisura mandibulae, at the intersection of the Processus condylaris and the Processus coronoideus
13	Most medial point of the Processus condylaris
14	Most ventral point of the Processus condylaris
15	Most lateral point of the Processus condylaris
16	Most anterior point on the curve of the Angulus mandibulae
17	Point at the tip of the Processus angularis
18	Most elevated point on the inferior border of the Ramus mandibulae
19	Lowest point on the ventral border of the Ramus mandibulae, right under the carnassial tooth
20	Most caudal and lowest point of the Synchondrosis intermandibularis on the medial side
21	Foramen mentale
22	Most rostral and ventral point of the Fossa masseterica
23	Most rostral point of the edge joining the basis of the Processus condylaris and Processus condylaris on the medial side.
24	Most rostral point of the Foramen mandibulae
25	The most lateral point on the Angulus mandibulae, at the beginning of the Processus angularis
Upper jaw	
1	Most rostral point of Os incisivum, between incisor teeth I1 in dorsal view
2	Most rostral point of Os nasale, on the midline (Sutura internasalis)
3	Most rostral point on Sutura nasoincisiva
4	Point at the junction of Os incisivum, Os nasale and Maxilla
5	Point at the junction of Os nasale, Maxilla and Os frontale
6	Most rostral point of Os temporale and most caudal point of Os nasale, on the midline (Sutura internasalis)
7	Most posterior point of the Maxilla in dorsal view
8	Most lateral point of the Processus zygomaticus of Os frontale
9	Most medial point of the curvature corresponding to the Linea temporalis, most medial point at the postorbital constriction
10	Processus frontalis of Os zygomaticum
11	Most rostral point of the curvature of the lower edge of the Fossa sacci lacrimalis
12	Bregmatic fontanel, most medial point of the Sutura coronalis, on the midline
13	Most medial point on the Sutura lambdoidea
14	Inion, posterior end of Os occipitale
15	Point at the extreme convex curvature of the Tuberculum nuchale
16	Point at the extreme convex curvature of the Crista supramastoidea
17	Fossa mandibularis, on the Sutura sphenoparietalis
18	Central point of the Sutura interincisiva in ventral view, just posterior to the two incisors teeth
19	Most rostral point of the Fissura palatina
20	Most caudal point of the Fissura palatina
21	Point on the Fissura palatina at the junction between Os incisivum and Maxilla in ventral view
22	Point between the Canina and the incisor tooth I3 at the junction between Os incisivum and

	Maxilla in ventral view
23	Most rostral point of Maxilla in ventral view, on the midline
24	Most rostral point of the Sutura palatomaxillaris, on the midline
25	Most caudal point of Os palatinum, on the midline
26	Point near molar tooth M2, on the Sutura palatomaxillaris
27	Ventral point on the Sutura sphenopalatina
28	Point on vomer, at the junction with Os presphenoidale (Sutura vomerosphenoidalis)
29	Most caudal point of the Synchondrosis sphenooccipitalis, on the midline
30	Most lateral point of the Synchondrosis sphenooccipitalis, rostrally to the Bulla tympanica
31	Most cranial point of the caudal curve of Os occipitale (Foramen magnum) in ventral view, on the midline
32	Most caudal point of the caudal curve of Os occipitale in ventral view
33	Point on the Foramen lacerum
34	Processus paracondylaris
35	Ventral tip of the Bulla tympanica
36	Most dorsal and caudal point of the curve of the Foramen alare caudale
37	Most ventral and posterior point at the junction of the Pars squamosa of Os temporale and Os zygomaticum, on the Arcus zygomaticus
38	Most caudal point at the junction between Maxilla and Os zygomaticum, near the molar tooth M2
39	Most cranial point of the alveolus of the canine tooth
40	Most caudal point of the alveolus of the canine tooth
41	Most cranial point of the alveolus of the upper carnassial tooth P4
42	Point between the alveolus of P4 and M1 teeth
43	Point between the alveolus of M1 and M2 teeth
44	Most caudal point of Maxilla behind tooth M2
45	Most dorsal point of the Foramen infraorbitale
46	Most ventral point of the Foramen infraorbitale
47	Point at the junction of Maxilla, Os lacrimale and Os temporale
48	Point at the junction of Maxilla, Os lacrimale and Os zygomaticum
49	Most caudal point of curvature at the junction of Maxilla and Os zygomaticum
50	Most ventral and caudal point of the Foramen alare rostrale
51	Most ventral and caudal point of the Fissura orbitalis
52	Most rostral point of Meatus acusticus externus in lateral view
53	Most caudal point of Meatus acusticus externus in lateral view
54	Opisthion, dorsal and caudal border of the Foramen magnum, on the midline



Movie 1. Video showing *in vivo* bite force recording in a Malinois dog.

Fig. S1. Position of origin (in blue) and insertion (in red) of the jaw adductors. MS: M. masseter pars superficialis; MP: M. masseter pars profunda; ZA: M. zygomaticomandibularis pars anterior; ZP: M. zygomaticomandibularis pars posterior; SZ: M. temporalis pars suprazygomatica; TS: M. temporalis pars superficialis; TP: M. temporalis pars profunda; PM: M. pterygoideus medialis.

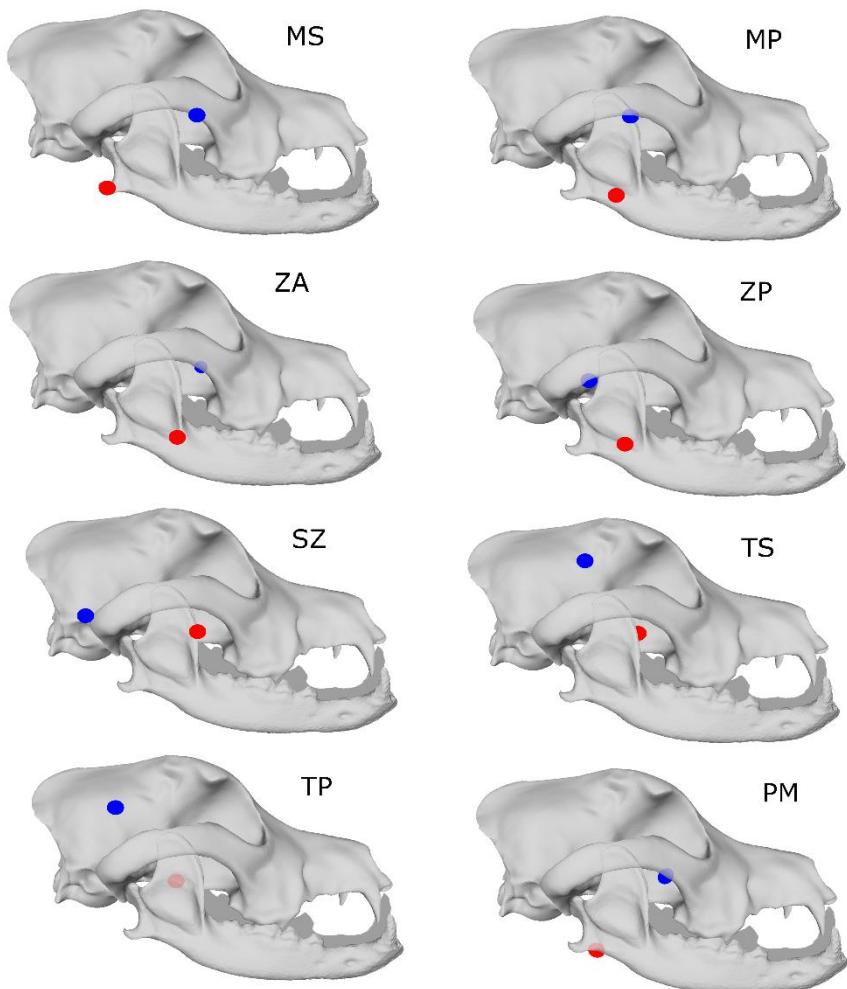


Fig. S2. 2-Block Partial Least Square Analyses between the shape of the upper jaw (A) or the shape of the lower jaw (B) and bite force (BF), with bite force vectors and shapes at the minimum and maximum of the PLS axis. Illustrations represent the deformations from the consensus to the extreme of the axis in lateral, dorsal and caudal views. Different morphotypes are indicated by different colors, and ages are indicated by different shapes. Ams: American Staffordshire terrier; Box: Boxer; Buld: Bulldog; Bult: Bull terrier; Chi: Chihuahua; Can: Cane Corso; Kin: Cavalier King Charles Spaniel; Pap: Papillon; Pit: Pitbull; Rot: Rottweiler; Mas: Mastiff; Fox: fox terrier; Bel: Belgian Shepherd; Bor: Border collie; Col: Collie; Dac: Dachshund; Ger: German Shepherd; Gol: Golden retriever; Hus: Husky; Leo: Leonberg; She: Shetland sheepdog. The right part of the scatterplots corresponds to the dogs with low bite forces, and that have a relatively elongated, flat and straight mandibular body in the sagittal plane, a small, narrow and posteriorly curved coronoid process with a shallow masseteric fossa, a medially short and small condylar process of the mandible and weak angular and coronoid processes. The braincase is lower in the lateral view, and the zygomatic arches are narrower. In contrast, the left part of the scatterplot corresponds to large brachycephalic dogs with a high bite and these have a very robust mandible with a relatively large, wide coronoid process with a deep masseteric fossa, a shorten, ventrally and laterally curved mandibular body, a big, medially extended and caudally curved condylar process of the mandible and a bigger angular process. The braincase is taller, and the zygomatic arches are wider in the dorsal view.

