one, for the third metacarpal. The anterior one is horizontal, stretched along the upper margin of the epiphysis; the posterior one is flat, elliptical, vertically elongated and much wider than the former.

In rear view the bone shows two parallel grooves, just over the margin of the distal articular surface, that fade out upward just as in the third metacarpal.

The distal articular surface can be considered the specular correspondent of that of the second metacarpal.

Phalanges (Tabs. 18-26)

The phalanges of the left hand are lacking.

The first and second phalanges of the second and fourth finger can be roughly considered specular one to another. They are prismatic and rather stocky.

In dorsal view these phalanges are characterized by a very shallow quadrangular glenoid cavity.

The ligament tubercles are remarkably protruding, especially the proximal ones that form some kind of a continuous lip on the rear face of the bones by coalescing with the intermediate insertion surface. The side ligament impressions are rather evident and tend to stretch out partially on the front face of the bones. The distal condyles of the second phalanges of the second and fourth finger are more amply developed and enveloping than those of the first phalanges that, instead, stretch out more extensively on the rear than on the front face of the bones. This might suggest a wider degree of relative movement between the second and third phalanx than between the first and second.

Also the third phalanges, again of the second and fourth finger, are rather symmetrical one to the other. They are not prismatic but somewhat "comma"-shaped. The retrossal apophysis is strongly pointed, while the basilar apophysis is barely developed. The dorsal groove between these two apophyses is narrow and deep in the third phalanx of the second finger, while in that of the fourth finger it is replaced by two large vascular foramina. The palmar process is strong, the pyramidal process wide and blunt, not too salient. The ligament fossette appears reduced, narrow and shallow.

In ventral view the solear surface is rather broad, with a badly distinguishable semilunar crest. A deep insertion surface and a shallow palmar groove bound the solear surface antero-posteriorly along its semilunar crest.

In dorsal view these third phalanges bear fairly shallow glenoid cavities. The solear surfaces appear characteristically rugose and pierced by a number of small vascular foramina.

The phalanges of the third finger are symmetrical and antero-posteriorly flattened. The first and second phalanx have a shallow, latero-medially stretched glenoid cavity. It seems surrounded by some kind of a ring or crown-like structure that results from a merging of all the proximal insertion surfaces and tubercles. Again, as in the first two phalanges of the second and fourth fingers, the distal condyle of the second phalanx seems more forejutting, more stretched out on the front face of the bone than that of the first phalanx.

The third phalanx of the third finger is rather broad and flat.

The retrossal apophysis is sharp, the basilar apophysis narrow, the dorsal groove, in between, fairly deep and narrow as well.

The two apophyses are fused together, enclosing the rear outlet of the dorsal groove and forming a sort of foramen. The base of the retrossal apophysis is pierced by a large vascular foramen.

The palmar process is quite strong.

In front, dorsal and lateral view the pyramidal apophysis appears blunt and not too salient.

Dorsally the glenoid cavity is transversely elongated and shallow. The ligament impressions that border laterally and medially the glenoid cavity are shallow, but easily recognizable, in shape of two narrow scissures.

In ventral view the semilunar crest is somewhat in form of a lifted, blunt fore border of the inser-

Tab. 27

CHARACTERS	ML	LL	Ba	Bi	Bti	BsI	HsI	Lar	La	Lo
SPECIMENS										
○ IGF 716	453?	397?	287	183	234?	31	62	79	88	93?
○ IGF 713	—	—	—	—	—	29	52?	78	84	88
• IGF 179 v	—	—	—	—	—	30	55	76?	79?	—
• IGF 174 v	—	—	—	—	—	26	57	—	—	—
• IGF 178 v	—	—	—	—	—	28	60	73	84	—
• IGF 4317	—	—	—	—	—	—	—	76?	88?	—
• IGF 1416 v	357?	378?	—	—	—	31	60	79	83?	—

Measuring points of the pelvis (Tab. 27; Fig. 7)

ML: medial length; LL: lateral length; Ba: breadth across the acetabula; Bi: breadth across the ischia; Bti: breadth across the Tubera ischiadica; BsI: breadth of the shaft of the ilium; HsI: height of the shaft of the ilium; Lar: inner length of the acetabulum; La: outer length of the acetabulum; Lo: length of the foramen obturatum.

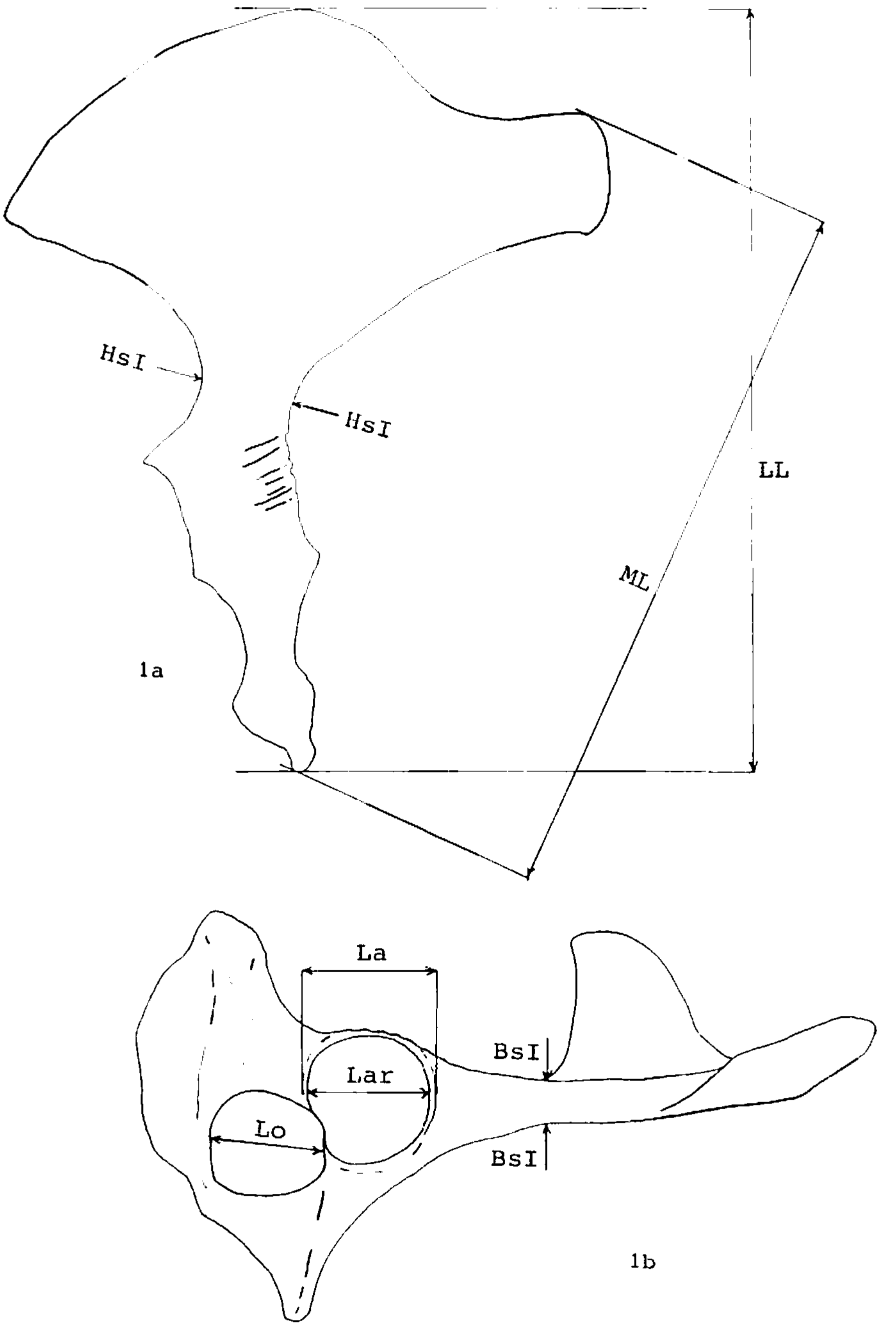

Fig. 7 - 1a - pelvis, dorsal view; 1b - pelvis, lateral view.

tion surface. The palmar groove is but barely marked.

All the outer surface of the phalanx is rugose and poorly pierced. The solear margin is rounded, not sharp.

Sacrum

This is the only sacrum of the Tuscan *D. etruscus* kept at the Museum of Florence. It is in awfull state of preservation.

It seems to be formed by three or four vertebrae. Just part of the spinal apophyses of the last vertebrae and part of the alae can be recognized.

Pelvis (Tab. 27)

The pelvis is rather badly preserved, but it is indeed the most complete pelvis of *D. etruscus* kept at the Museum of Florence. Most of the margins of the ilia are nicked: the iliac crests, for example, are scraped away. The pelvic symphysis is not complete: only the pubes meet along the sagittal plane of the bone, while the ischiatic portion of the symphysis is not preserved.

The ilium is broad and vaguely resembles, in shape, an anchient war axe. Its dorsal face is amply concave. The tuber coxae seems wider than the sacral tuber. The gluteal line is barely visible.

The ilium neck is short, dorso-ventrally flattened and subtriangular in cross section; caudally its blunt dorso-medial border becomes progressively sharper and very prominent, thus forming the ischiatic crest, which appears streaked by shallow insertion grooves.

In lateral view the acetabulum is subcircular, rather deep and surrounded by a sharp edge which bears a wide and shallow ventral incisure. The acetabulum is faced ventro-laterally. Anteroventrally.to the acetabulum the ilio-pubic eminence forms a moderate transversely elongated relief.

In medial view the ilium appears smooth. Along a prominent, sharp linea arcuata the psoas minoris tubercle is in shape of an evident relief. Scanty vascular grooves streak this face of the ilium, while the ileac tuberosity is rather marked.

A well developed rugosity for the insertion of the cranial rectus muscle of the thigh can be observed on the dorsal surface of the bone, close to the ilium-ischium transition and antero-dorsally to the acetabulum.

The ischium corpus is short and subtriangular in cross section, the ischium branch flattened and the tabula ossis ischii laterally concave. The ischiatic tuberosity is very developed; it fans out bowing laterally outward and is dorsoposteriorly-anteroventrally inclined. Its crest is very prominent and rather sharp. The incisura ischiadica minor is in shape of a narrow shallow arch.

The ischium and pubis bound a very wide open subcircular foramen obturatum. As already mentioned, the parts of the ischia destined to contribute to the pelvic symphysis are not preserved.

The medial portion of the pubis, in dorsal and ventral view, is narrow and far thinner, in front and rear view, than the other pelvic bones. Its ventral face is concave (pubic scissure), while dorsally it appears distinctly convex. The ventral pubic tubercle seems rather strong. The cross section of the corpus of the pubis is subelliptical to subtriangular. Other pubic structures are not recognizable. The ileo-pubic crest is prominent, but fades out cranially towards the ilium.

The proportions of the cavum pelvis (sagittal diameter mm 269; transversal diameter mm 187), the not too spaced ischiatic crest, the short ilium necks suggest that the specimen might be a male.

Femur (Tab. 28)

In front view the trocanter major is lower than the femoral head. It appears steadily convex and triangular-shaped, with its vertex pointing outward. An evident intertrocanterine line traces an arch along the ventral margin of the femoral head directed medially, then it bends downward, at first running tangent of the troncanter minor and at last merging with it. The trocanter minor is generally well developed and bears a strong rugosity. Another marked structure is a line stretched along the sagittal axis of this face of the bone: it separates the two areas destined to house the two halves of the vastus intermedius muscle. The line is restricted to the sole dorsal half of the bone.

TAB. 28

CHARACTERS	L	PL	BP	DC	BD	DD	HT	BS	BT
SPECIMENS									
○ IGF 716	440	450	161	74	122	150	70	61	120
○ IGF 487 v ☐	442	447	160	71	121	140	—	58	—
○ IGF 2234 v	—	—	155	66	—	—	—	56	120?
○ IGF 2235 v	—	—	—	70	—	—	—	59?	—
○ IGF 722	407	442	150	66	115	137	59	51	109
○ IGF 710	—	—	169	82	—	—	71	63	136
• IGF 1868	—	—	—	—	—	—	—	70?	—
• IGF 1872	—	—	—	—	—	—	52	60	—
• IGF 4326	—	—	—	—	—	—	—	58	—
• IGF 1878	—	—	—	—	—	—	—	71?	—
• IGF 1879	—	—	—	—	—	118?	—	—	—
• IGF 1875	—	—	—	—	—	—	—	57	—
• IGF 1870	—	—	—	—	—	—	—	50	—
• IGF 1873	—	—	—	—	—	—	50?	61	—
• IGF 162 v	—	—	161	72	—	—	—	60	—
• IGF 176 v	—	—	—	—	—	—	60	68?	—
• IGF 4341	—	—	—	71	—	—	—	—	—
• IGF 4343	—	—	—	63?	—	—	—	—	—
• IGF 4342	—	—	—	67?	—	—	—	—	—
▲ n. 7, g.c. n. 10	—	—	—	—	112?	119	—	—	
▲ n. 8, g.c. n. 10	—	—	—	—	131	149	—	65	—

Measuring points of the femur (Tab. 28; Fig. 8)

L: length; PL: physiologic length; BP: breadth of the proximal epiphysis; DC: depth of the caput; BD: breadth of the distal epiphysis; DD: depth of the distal epiphysis; BT: breadth across the trocanter tertius; BS: breadth of the diaphysis; HT: height of the trocanter tertius

The trocanter tertius stems out transversely, at about the middle of the diaphisis; it is very robust, slightly enlarged outward and markedly bent forward. The lateral epicondyle is remarkably solid, whereas the medial epicondyle is quite less developed.

In lateral view the bone appears antero-posteriorly flattened near the proximal epiphysis; the rest of the shaft has a flat rear surface but its anterior face is strongly convex. The trocanter crest is well evident though blunt in its proximal end and gets increasingly sharper and rather more prominent distally where it finally reaches the trocanter tertius.

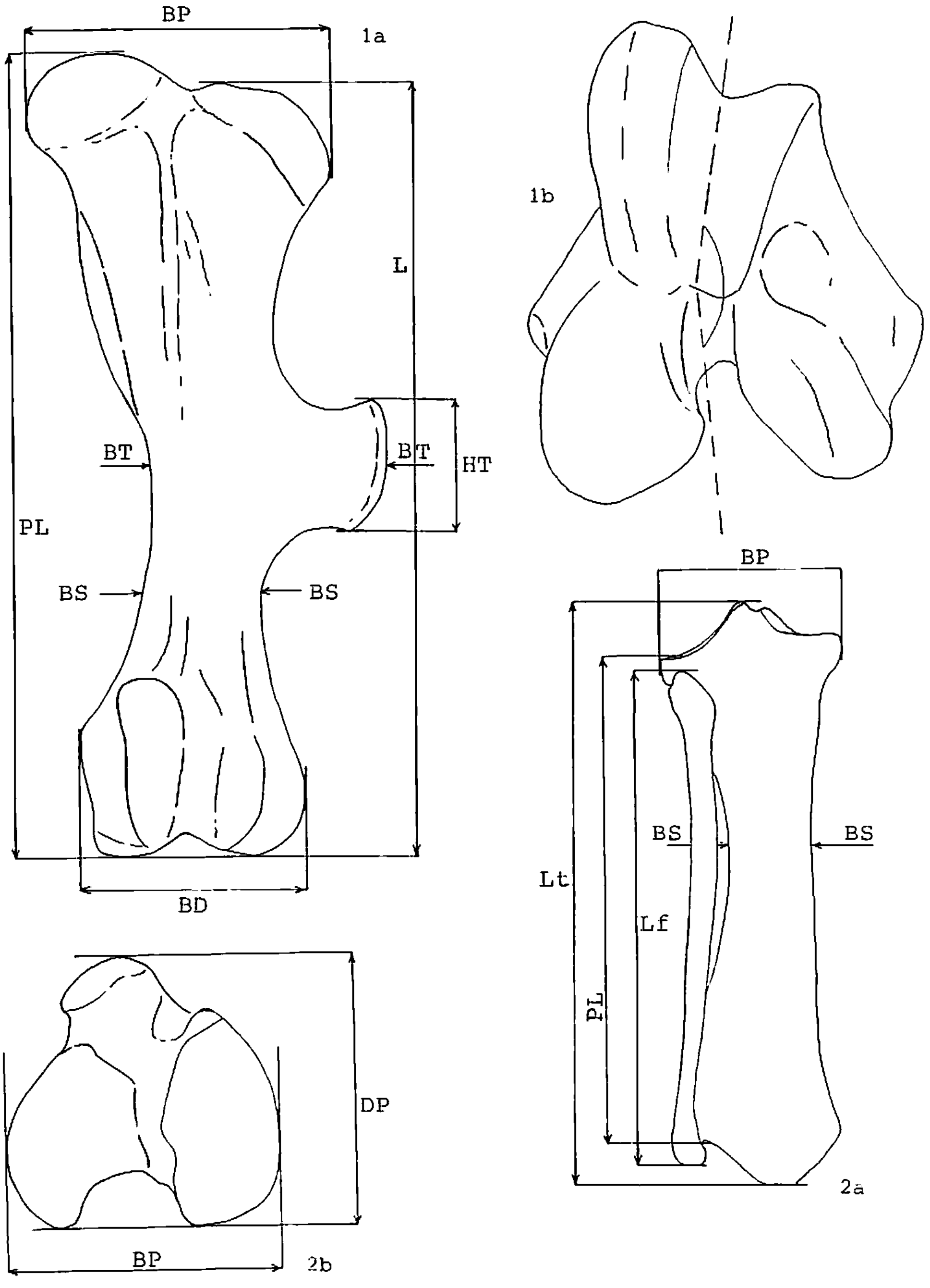

Fig. 8 - 1a - left femur, anterior view; 1b - left femur, distal view; 2a - left tibia, posterior view; 2b - left tibia, proximal view.

The supracondyloid fossa is not easily recognizable; it is extremely shallow and displaced on the rear face of the bone.

A clear and rather deep ligament insertion fossette occurs on the lateral condyle, whilst the popliteal fossette consists in a wide insertion rugosity. The fossa extensoria is relatively deep.

In rear view the femoral head has a well marked, shallow and rather long ligament fossette, located on line with the medial margin of the bone. In this view the trocanter major shows a quite protruding ventral margin. The trocanter major and the femoral head are widely separated by a broad and shallow neck incisure. The trocanter fossa is relatively deep and the two insertion rugosities of the gemelli and the obturatorius muscles are easily recognizable, though rather hard to distinguish one from another. A well developed intertrocanterine crest dies out downward into the obturatorius rugosity. Several muscular insertion rugosities, namely that of the trocanter minor, the narrow and elongated one of the vastus medialis, that of the lateral thigh adductor, the rather small one of the biceps femoris, the broad ones of the outer gastrocnemius and plantaris-flexor digitorum, confined within the shallow supracondyloid fossa, as well as the small one of the inner gastrocnemius, are most evident. In this view the medial epicondyle appears rather prominent, with a marked central fossette, while the lateral epicondyle is not as strong. The intercondyloid fossa is very deep and quite narrow, with short intercondyloid line that dies out medially from the lateral condyle.

The trocanter minor rugosity, in medial view, extends upward reaching another rugosity ventral to the ligament fossette of the femoral head. In the same view the medial epicondyle shows two or possibly three little fossettes along its rear border.

In dorsal view the proximal end of the bone is characterized by a hemispherical femoral head mounted on a very solid, strong neck.

The trocanter major appears triangular with an anteriorly vergent distal vertex; it bears a clear lengthwise running line that separates a front portion destined to the scansorius from a rear portion for the inner vastus.

The distal epiphysis, in ventral view, shows deep and circular fossa extensoria on its lateral flank. The intercondyloid fossa is very deep and U-shaped. The medial epicondyle appears somewhat more prominent than the lateral epicondyle; the latter bears an evident ligament fossette and a scissure that borders the lateral condyle. The angle between the axis of the trochlear groove and the intercondyloid axis is about 168°.

Tab. 29

CHARACTERS	L	DT	DAP
SPECIMENS			
○ IGF 716	99	83	48

Measuring points of the patella (Tab 29; Fig 9)
Measurement scheme of Guérin (1980)

L: length; DT: transversal diameter; DAP: antero-posterior diameter

Patella (Tab. 29)

These are the only two patellae of the Tuscan *D. etruscus* kept at the Museum of Florence.

In front view they appear somewhat romboidal with a mammillary-shaped, robust, salient medial edge and, instead, a rather rounded, blunt lateral edge. The base is very prominent with a convex lateral face and a concave medial face. The apex is sharp. The front surface of the bone is rugose and very protruding.

In rear view the articular surface is distinguished into two dorso-ventrally elongated halves, a concave and deeper medial one and a shallower lateral one, by a sagittal relief.

Tibia and fibula (Tab. 30)

Tibia

The description mainly concerns the right tibia, being the left one deformed, as explained far above.

The tibia, in front view, bears a well developed, strong, ovoidal tibial tuberosity, laterally flanked by a wide but fairly shallow tibial fossa. The tibial crest is protruding though blunt in its upper portion and gets increasingly sharper distally. The digital fossa is very deep and narrow. A very salient tibial spine towers over the dorsal face of the proximal epiphysis; the lateral and medial tuberosities are remarkably prominent. The front face of the distal half of the shaft and of the distal epiphysis is flat.

The lateral malleolus is fairly prominent, while the medial malleolus is slightly protruding.

The lateral face of the bone is barely concave proximally and rapidly flattens distally. A marked

Tab. 30

CHARACTERS	Lt	PL	BP	DP	BD	DD	BS	DS	Lf
SPECIMENS									
○ IGF 716	354	303?	111	107	100	67	54	67	311
○ IGF 487 v ☐	376	331?	115	112	94	67	51	67	—
○ IGF 722	336	287	105	101	96	58	51	58	265
○ IGF 2237 v	—	—	110	115	—	—	50	—	—
• IGF 1883	—	—	—	—	99	55	—	—	—
• IGF 1912	—	—	—	—	—	—	49	—	—
• IGF 1884	—	—	—	—	83	59	—	—	—
• IGF 1882	—	—	—	—	83?	55?	—	—	—
• IGF 1881	—	—	97?	—	—	—	—	—	—
• IGF 4339	—	—	—	—	—	—	54	—	—
• IGF 168 v	343	293	104?	113?	85?	62	55	62	—
• IGF 4340	—	—	—	—	91	61	55	61	—
• IGF 161 v	361	317?	79?	—	75?	58	49	56	—
• IGF 181 v	338	293?	78?	—	83?	59	—	60	—
• IGF 180 v	—	—	87	—	—	—	55	—	—
• IGF 167 v	—	—	94	—	—	—	46	—	—
▲ n. 12, g.c. n. 10	—	—	—	—	82	58	50	48	—
▲ n. 11, g.c. n. 10	—	—	—	—	94	57	—	—	—
▲ n. 10, g.c. n. 10	—	—	—	—	82	60	51	41	—
▲ n. 9, g.c. n. 10	—	—	—	—	—	—	58?	50?	—
▲ n. 14, g.c. n. 10	368	317	114	109	108	63	54	52	—
▲ n. 16, g.c. n. 10	—	—	—	—	—	—	48	44	—

Measuring points of the tibia/fibula (Tab. 30; Fig. 8)

Lt: length of the tibia; PL: physiologic length of the tibia; BP: breadth of the proximal epiphysis. DP: depth of the proximal epiphysis. BD: breadth of the distal epiphysis; DD: depth of the distal epiphysis; BS: breadth of the shaft; DS: depth of the shaft; Lf: length of the fibula

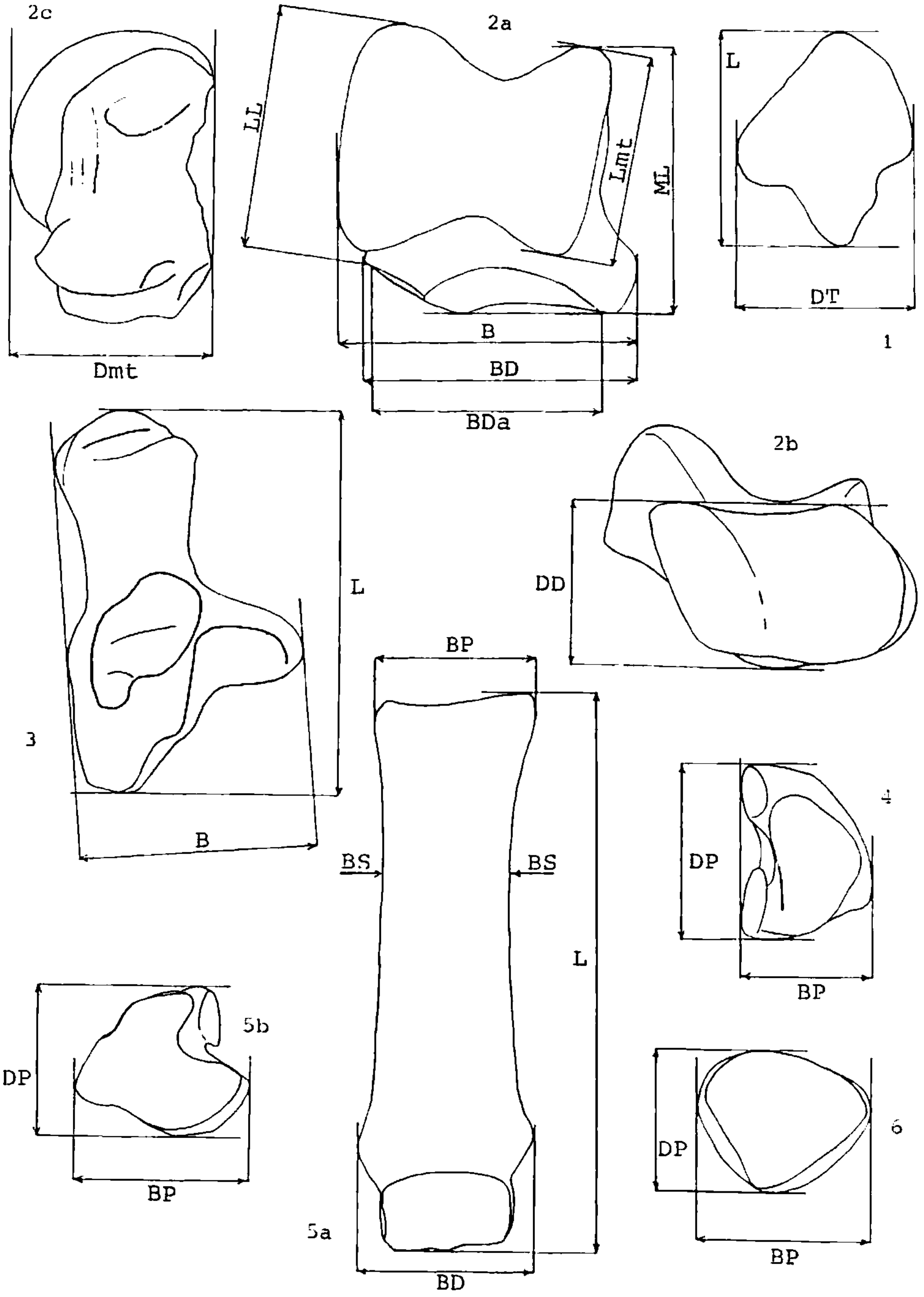

Fig. 9 - 1 - right patella, anterior view; 2a - right astragalus, dorsal view; 2b - right astragalus, distal view; 2c - right astragalus, medial view; 3 - right calcaneum, dorsal view; 4 - left scond metatarsal, proximal view; 5a - left third metatarsal, anterior view; 5b - left third metatarsal, proximal view; 6 - right fourth metatarsal, proximal view.

line originates at the lateral tuberosity-fibula articulation, runs forward all along the proximal articular surface and at last bends downward before reaching the tibial tuberosity.

In lateral view the tibial spine shows a rounded profile and still appears very salient. The tibial groove is very wide but quite shallow.

In rear view the proximal articular surfaces show extremely sharp, well marked edges. The central intercodyloid area is deep and narrow; it opens into a broad, shallow popliteal incisure. Along the shaft the popliteal lines are not much evident. The borders of the interosseus arch appear remarkably sharp.

In medial view the medial tuberosity appears very projected backward. The medial malleolus is weak, as already mentioned.

The proximal end of the tibia, in dorsal view, shows a hemispherical tibial tuberosity mounted on a thick neck-like structure, which, on the whole, gives it a mushroom aspect. The caudal and central intercondyloid grooves are very deep; they are separated by a relief almost at the center of this face of the bone. The cranial intercondyloid area is wide and shallow. The medial articular surface is flat and rather antero-posteriorly elongated; the lateral surface is flat as well, but somewhat arcuate. Both surfaces lift up abruptly towards the center of this face, forming the tibial spine; their margins are very well marked. The lateral rim of the tibial spine is higher than the medial rim.

A very deep elliptical insertion fossette occurs anterior of the medial articular surface.

In ventral view the distal end of the bone shows fairly protruding, rounded medial malleolus. The medial articular surface is deep and obliquely elongated forward and outward. A very prominent crest separates it from the broad, subcircular lateral surface.

Fibula

The fibula, though comparatively very reduced with respect to the tibia, is fully developed; its diameter keeps rather constant all along its length.

The proximal end of the fibula is about in form of a rather flattened, expanded ovoid with a decidedly flat articular surface for the tibia. Moving distally, the shaft gets strongly angular (it appears quadrangular in cross section) and is markedly twisted outward along its length.

The fibula firmly articulates with the lateral malleolus of the tibia at its distal end.

The interosseus arch is narrow and stretches out from the base of the lateral tuberosity all along most of the tibia-fibula shafts, but does not reach the fibula-malleolus connection.

Tarsus (Tabs. 31-37)

Astragalus (Tab. 31)

The astragalus is a stout, compact bone, quadrangular in shape in both dorsal and plantar views. The trochlea has a rather broad, deep and just slightly laterally verging trough. Its lateral lip is larger and comparatively less sloping than its medial lip. A blunt, rather protruding tubercle occurs on the medial face of the caput tali.

In plantar view the astragalus bears three articular surfaces for the calcaneum. The broadest is placed at the latero-proximal edge of the bone. It is roundish and strongly concave, with a small, convex, latero-medially stretched distal prolongation. Another surface is shifted in a more medio-distal position. It is roundish to elliptical in shape, wide and markedly convex. These two surfaces are separated by a very deep and narrow tarsal sinus. The third articular surface for the calcaneum represents a lateral extension of the second surface along the distal margin of this face of the bone. It appears elongated, sometimes crescent-shaped and more or less flat.

In distal view two more articular facets are present: a very broad, romboidal, amply convex one for the navicular, with an extremely weak latero-medially elongated concave portion along its plantar margin, and laterally and separated by a blunt but evident edge, a smaller, convex, elliptical and obliquely stretched one for the cuboid. The latter is markedly concave at its innermost end. The margins of these distal articular surfaces are very well marked; in particular the dorsal margin is straight or even barely concave.

In lateral view the ligament insertion surface is reduced and quite shallow.

TAB. 31

CHARACTERS	LL	ML	B	BD	DD	BDa	Lmt	Dmt
SPECIMENS								
○ IGF 716	73	–	86	72	44	—	61	50
○ IGF 487 v ⊓	70	68	79	70	41	69?	59	50
○ IGF 731	74	71	82	71	45?	68	63	48
○ IGF 1807 v	70	65	75	64	38	63	57	47
○ IGF 2243 v	72	71	77	67	43	65	58	49
○ IGF 728	74	74	83?	70	40	68?	62	50
• IGF 1897	73	73	78	63?	40	—	60	47
• IGF 1894	75?	70	81?	—	41?	—	61	44?
• IGF 1895	72	72	82	72	47	70	61	53
• IGF 1895	73	67	79	65?	41	58?	55?	47
• IGF 1893	—	—	—	—	—	—	59	—
• IGF 1892	69	58	—	58?	41	58?	54	44
▲ n. 17, g.c. n. 10	73	—	—	—	43?	—	-	—

Measuring points of the tarsus
Astragalus (Tab. 31; Fig. 9)

LL: lateral length; ML: medial length; B: breadth; BD: breadth of the distal end; DD: depth of the ddistal end; BDa: breadth of the distal articular surface; Lmt: length of the medial lip of the trochlea; Dmt: depth of the medial lip of the trochlea

TAB. 32

SPECIMENS	IGF 716 ○	IGF 487 v ○	IGF 731 ○	N. 1888 ○	IGF 2238 v ○	IGF 719 ○	IGF 1885 •	IGF 1887 •	n. 17, g.c. n. 10 ▲
CHARACTERS		⊓		⊓					
L	121	121	122	120?	—	109	—	120	122
B	75	72	—	—	68?	70	75	70	70

Calcaneum (Tab. 32; Fig. 9)

L: length; B: breadth

Calcaneum (Tab. 32)

Like the astragalus, the calcaneum is a thick, short, stout bone. It shows a swollen and rugose summit, composed of a dome-shaped structure mounted on a triangular base with a vertex pointing outward and forward. This latter, in dorsal and plantar view, has a peculiar beak-like appearance. The summit rugosity spreads out on the rear face of the bone to some extent.

In dorsal view, the calcaneum shows three articular surfaces for the astragalus. One is located on the sagitttal axis of the bone, levelled with the sustentaculum tali; it is rather irregularly shaped, very convex in its proximal portion and, instead, strongly concave in its distal half. Another articular surface is placed on the well developed and rather slender sustentaculum tali; it is broad, markedly concave and extends distally getting abruptly narrower and joining the third articular surface. The latter is flat and stretches, enlarging progressively but slowly, keeping quite narrow on the whole, all along the medial and distal margins of this face of the bone.

In dorsal and plantar view the sustentaculum tali appears rather long and thick and weakly oblique, pointing downward to some degree.

In lateral view the bone shows a slightly concave posterior border.

Finally, in distal view, a rather broad, concave, somewhat crescent-shaped surface for the articulation with the cuboid occurs.

Navicular (Tab. 33)

The navicular is a low, large, transversely expanded bone. The dorsal articular surface for the astragalus is romboidal, barely convex antero-posteriorly and very concave latero-medially.

In ventral view two broad heart-shaped articular facets are present. The lateral one, for the articulation with the third cuneiform, is somewhat wider and convex, with a weakly concave rear margin; the medial one, for the second and first cuneiforms, is flat and bends slightly and blandly upward in its medialmost portion.

The bone, in rear view, is characterized by a strong, protruding posterior apophysis that divides this face into a medial and a lateral half. The latter bears an irregular articular surface for the cuboid. It consists of a wide, flat, rounded rear portion with a narrow, slightly concave antero-dorsal extension along the postero-lateral part of the dorsal margin of the bone. Both portions are separated respectively from the ventral and dorsal articular surfaces by sharp edges.

Cuboid (Tab. 34)

This lateral tarsal bone is in form of a solid cube with a thick posterior down-bending process. The dorsal articular surface is square; a weak antero-posterior groove divides it into a lateral and a medial half. The former is relative to the calcaneum and is rather larger than the latter, that, instead, is relative to the astragalus. Both are antero-posteriorly concave.

In medial view the bone shows two articular facets. One is located at the antero-ventral angle of the bone; it is small, convex, triangular and represents the anterior articulation for the third cuneiform. The other is wider and much more complicated. It first stretches along the dorsal margin of the bone, then bends down extending ventrally and widening so to occupy about all the rear half of this face of the cuboid. The dorsal portion is narrow, elongated, crescent-shaped, convex; the rear portion is concave at first and then flattens. All this surface is relative to the navicular. At the ventralmost end of its rear portion it is separated, by a sharp edge, from another small, semicircular, flat, ventro-medially oriented surface which represents the rear articulation for the third cuneiform. The two articular surfaces for the third cuneiform are separated by a wide, deep, anterodorsally-posteroventrally stretched groove. The articular surface for the navicular furtherly extends along the dorsal margin of the rear face of the bone so that, on the whole, the surface for the navicular bounds all the medial and posterior borders of the portion of the dorsal articular surface destined to the astragalus.

Ventrally the bone bears a triangular articular facet for the fourth metatarsal; it is slightly concave antero-posteriorly and transversely flat in its front half and convex in its rear half.

First cuneiform (Tab. 35)

Only the left first cuneiform is present.

The bone is dorso-ventrally elongated with a postero-lateral process stretched downward. At its dorsal end it bears a roundish, slightly concave articular surface for the navicular. The other articular surfaces for the second cuneiform and for the second metatarsal, on the anterior face of the bone, are not preserved.

Second cuneiform (Tab. 36)

Only the left second cuneiform is present.

This small, somewhat wedge-shaped bone bears a flat, subtriangular dorsal articular facet for the navicular. On both medial and lateral sides of the dorsal surface we find, respectively, a small, flat, elongated facet for the third cuneiform and a small, flat, subtriangular one for the first cuneiform.

Ventrally an antero-posteriorly elongated, elliptical, transversely convex articular surface for the second metatarsal occurs.

Third cuneiform (Tab. 37)

The largest of these three distal tarsal bones appears L-shaped in both dorsal and ventral view, as it is latero-medially stretched in its front portion and bends abruptly backwards, at about right angles, at its medial end. It shows a subtriangular, broad, concave dorsal articular surface for the navicular.

In medial view along the border of the dorsal sur-

Tab. 33

CHARACTERS	L	l	H
SPECIMENS			
○ IGF 716	59	47	30
○ IGF 487 v □	—	—	30?
○ IGF 731	54	45	28
• IGF 1952	56	46	27
• IGF 1951	56	45	28
▲ n. 17, g.c. n. 10	62	44	29

Tab. 34

CHARACTERS	L	l	H	DAP art. prox.	DT art. prox.	H fac. ant.
SPECIMENS						
○ IGF 716	61	47	60	35	40	42
○ IGF 731	—	43	—	36	39	42
○ IGF 2220 v	56	36	50	41	32	37
○ IGF 2229 v	56	42	51	37	38	37
• IGF 1960	—	39	—	41?	37	36
▲ n. 17, g.c. n. 10	58	43	48	35	42	41

Tab. 35

CHARACTERS	L	DT	DAP
SPECIMENS			
○ IGF 716	46	29	19
▲ n. 17, g.c. n. 10	44	30	20

Tab. 36

CHARACTERS	L	l	H
SPECIMENS			
○ IGF 716	32	21	18
▲ n. 17, g.c. n. 10	33	21	21

Tab. 37

CHARACTERS	L	l	H
SPECIMENS			
○ IGF 716	46	41	26
○ IGF 487 v □	44	36	24
○ IGF 731	42	39	23
• IGF 1958	46	43	23
• IGF 1959	45	38	25
▲ n. 17, g.c. n. 10	47	42	27

Other tarsal bones (Tabs. 33 to 37): Tab. 33 - navicular; Tab. 34 - cuboid; Tab. 35 - first cuneiform; Tab. 36 - second cuneiform; Tab. 37 - third cuneiform

As for carpal bones, Guérin's (1980) measurement schemes were followed also in measuring these other tarsal bones. New abbreviations in additionS in addition to the ones seen for carpal bones are: DAP artic. prox./DT artic. prox.: antero-posterior/transversal diameter of the proximal articular surface
H fac. ant.: height of the anterior face

face, a long, flat, crescent-shaped facet for the second cuneiform is present, together with two other surfaces for the second metatarsal, placed at the front and rear ends of the ventral margin of this face of the bone. Both are roundish, slightly concave to almost flat.

In lateral view along the rearmost margin of the dorsal articular surface a little, flat, crescent-shaped facet occurs, as well as another small, subtriangular, flat one at the front end of the ventral border of this face. Both form the articulation with the cuboid. The postero-dorsal surface is slightly wider than the antero-ventral one.

Finally, in ventral view a broad articular surface for the third metatarsal expands over all this face of the bone. It is rather flat anteriorly and gets slightly concave towards its rearest portion.

Second metatarsal (Tab. 38; Pl. 9, fig. 4)

This metatarsal shows a marked torsion at its proximal end; as a matter of fact its lateral margin, in front view, twists upwards to a more sagittal position.

In dorsal view the proximal end of the bone bears a fairly concave, antero-medially to postero-laterally stretched dorsal articular surface for the second cuneiform.

In lateral view the proximal epiphysis shows an anterior and a posterior articular facet. The anterior one is subelliptical, while the posterior one is roundish in the left second metatarsal and dorso-ventrally stretched, somewhat kidney-shaped in the right one. Both are about equally extended and are composed of two distinct portions, a dorsal and a ventral half, respectively for the third cuneiform and the third metatarsal.

In posterior view a small, roundish, barely convex articular surface for the first cuneiform characterizes the proximal epiphysis.

The shaft is strong and somewhat subtriangular in cross section.

The distal articular surfaces of all metatarsals are very similar to the correspondent ones of the metacarpals, though rather more transversely compressed.

The second metatarsal has a fairly deep lateral ligament insertion fossette and, instead, a quite shallow medial fossette.

Third metatarsal (Tab. 39; Pl. 9, fig. 5)

The bone is straight, quite large in front and rear view and rather antero-posteriorly compressed in lateral and medial view.

The dorsal articular facet, in dorsal view, is irregularly T-shaped, flat to barely concave and so broad to extend over all this face of the bone. It is rather more latero-medially expanded than antero-posteriorly stretched.

The proximal epiphysis, in lateral view, shows an anterior and a posterior articular surface for the fourth metatarsal. The anterior one is broad, trapezoidal in shape and slightly concave; the posterior one is elliptical, posterodorsally-anteroventrally stretched, slightly concave and located on the lateral face of the rear process of the epiphysis. They are both about the same length.

In medial view other two very small articular surfaces for the second metatarsal occur just along the border of the dorsal surface. Both are subtriangular, convex and of about the same size.

The shaft, in cross section, is more robust in its lateral half than in its medial half that appears somewhat antero-posteriorly squeezed for the occurrence of quite deep tendon and ligament grooves. Both ligament insertion fossettes are rather deep.

Fourth metatarsal (Tab. 40; Pl. 9, fig. 6)

The bone seems somewhat specular to the second metatarsal; as a matter of fact, in front view, an evident torsion of the proximal epiphysis is remarked by the medial margin of the bone that bends, upwards, to a more sagittal position.

In dorsal view we can observe a broad, subtriangular, barely concave facet for the cuboid.

Two other proximal articular surfaces, for the third metatarsal, are present at the antero-medial corner of the epiphysis. Both are rather flat, subelliptical and of about the same size.

The shaft is about elliptical in cross section and bears a longitudinal groove that runs from the antero-lateral face of the proximal epiphysis down to the medial face of the distal epiphysis.

In front/rear view the shaft appears distinctly arched forward.

The medial ligament insertion fossette is deeper than the lateral one.

Phalanges (Tabs. 41-49)

The phalanges closely resemble the corresponding ones of the hand, but are quite more slender and smaller. The third phalanx of the third and fourth finger of the left foot are lacking.

Other two almost complete right limbs, a fore one (IGF 488v) and a rear one (IGF 487v) of a young Tuscan *D. etruscus* individual were recently found at Casa Frata, Upper Valdarno and are now kept at the Museum of Florence.

Both limbs are rather well preserved. The patella, some basipodial bones (namely the pyramidal, pisiform, trapezium, cuboid, first and second cuneiforms) and some phalanges are lacking.

The bony elements that compose these limbs are described below.

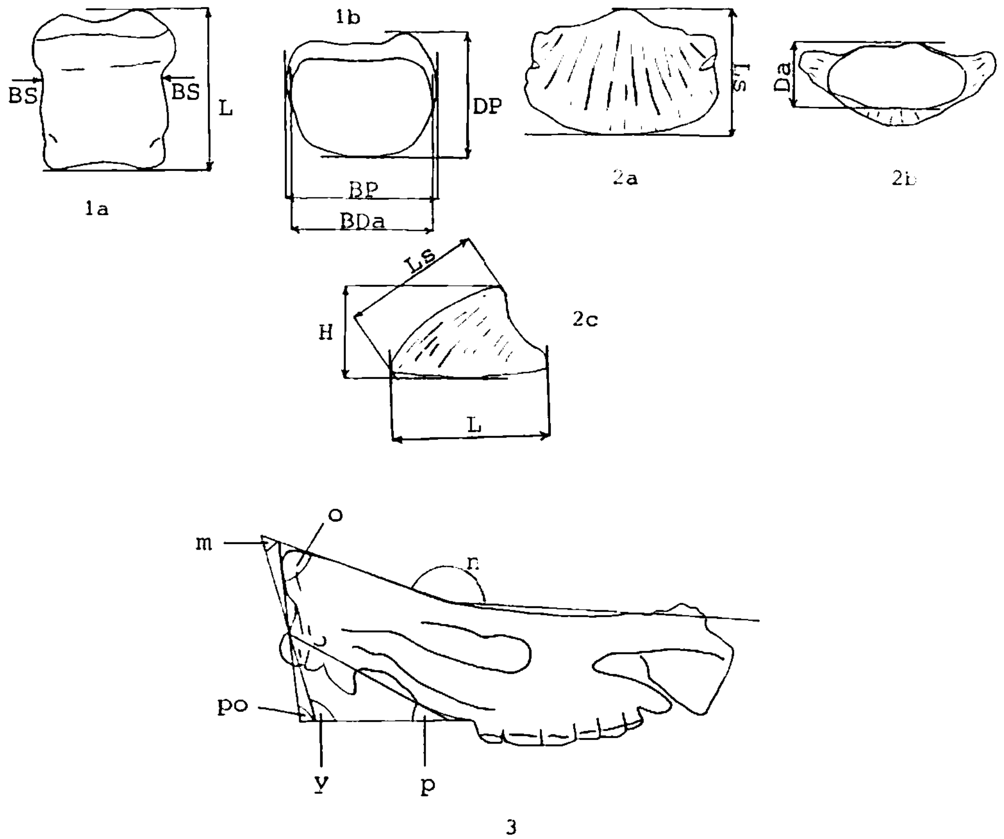

Fig. 10 - 1a - phalanx, anterior view; 1b - phalanx, proximal view; 2a - third phalanx, anterior view; 2b - third phalanx, dorsal view; 2c - third phalanx, side view; 3 - cranial angles.

Tab. 38

CHARACTERS	L	BP	DP	BD	DD	BS	DS
SPECIMENS							
○ IGF 716	162	34	34	37	37	29	24
○ IGF 487 v ☐	—	—	—	34	36	24?	23?
○ IGF 731	149	32	24	35	34	23	24
○ IGF 715	179	39	42	44	44	30	29
○ IGF 2239 v	—	34	30	—	—	20	22
○ IGF 714	145	36	34	34	33	25	23
• IGF 1923	131?	—	—	—	—	24	21
• IGF 1933	—	—	—	—	—	28	21
• IGF 1924	152	36	25	41	34	26	24

Tab. 39

CHARACTERS	L	BP	DP	BD	DD	BS	DS
SPECIMENS							
○ IGF 716	182	52	—	55	37	41	24
○ IGF 487 v ☐	183	49	—	54	38	43	22
○ IGF 731	175	50	39	53	36	39	21
• IGF 1919	—	49	35	—	—	—	21
• IGF 1922	186?	43?	—	53?	—	39	23
• IGF 1920	—	47	—	—	—	—	20
• IGF 1917	—	49	—	—	—	—	—
• IGF 1918	—	—	—	45?	—	—	—
• IGF 1921	—	46?	29	—	—	39	21
▲ n. 17, g.c. n. 10 ☐	—	—	—	51	38	41	21
▲ n. 19, g.c. n. 10 ☐	161	48	40	52	41	40	22

Tab. 40

CHARACTERS	L	BP	DP	BPa	BD	DD	BS	DS
SPECIMENS								
○ IGF 716	163	44	—	—	38	38	31	19
○ IGF 487 v ☐	156	43	35	38	38	35	28	20
○ IGF 731	—	41	35	36	—	—	—	—
○ IGF 2233 v	—	41	37	37	—	—	27	19
○ IGF 2239 v	—	35	34	32	—	—	26	18
• IGF 1931	—	36	33	—	—	—	25	18
• IGF 1937	150	36	35	—	32	33	28	20
• 1934	—	38	33	—	—	—	29	15
▲ n. 17, g.c. n. 10 ☐	143	45	36?	—	33	34	28	20

Measuring points of metatarsals (Tabs. 38 to 40; Fig. 9): Tab. 38 - second metatarsal; Tab. 39 - third metatarsal; Tab. 40 - fourth metatarsal
Abbreviations are the same as in metacarpals.

Humerus (Tab. 8)

The bone is mostly restored.

The greater tubercle summit is very salient and bends a little inward and backward, while the lesser tubercle summit is a bit shorter and acute.

The intertuberal groove is broad and shallow. The greater tubercle convexity is far more prominent than that of the lesser tubercle. The tricipital line is slightly developed; the teres minor tuberosity is apparently lacking. The deltoid tuberosity is

Tab. 41

CHARACTERS	L	BP	DP	BPa	BD	BDa	BS
SPECIMENS							
○ IGF 716	37	37	35	28	32	30	32
○ IGF 487 v ☐	41	34	36	31	32	31	32
○ IGF 715	35	41	42	29	34	34	36
• IGF 1916	44	35	33	30	33	31	33

Tab. 42

CHARACTERS	L	BP	DP	BPa	BD	BDa	BS
SPECIMENS							
○ IGF 716	29	34	25	29	23	23	34
○ IGF 487 v ☐	33	35	24	31	30	25	31
○ IGF 715	37	35	27	31	30	—	32

Tab. 43

CHARACTERS	L	B	Ba	Da	Ls	H
SPECIMENS						
○ IGF 716	37	50	29	21	35	22

Tab. 44

CHARACTERS	L	BP	DP	BPa	BD	BDa	BS
SPECIMENS							
○ IGF 716	44	47	36	42	40	38	39
○ IGF 487 v ☐	42	43	35	37	36	36	36
• IGF 1956	—	49	32	45	—	—	—

Tab. 45

CHARACTERS	L	BP	DP	BPa	BD	BDa	BS
SPECIMENS							
○ IGF 716	33	46	25	40	37	36	—

Tab. 46

CHARACTERS	L	B	Ba	Da	Ls	H
SPECIMENS						
○ IGF 716	—	—	—	19	37	23

Tab. 47

CHARACTERS	L	BP	DP	BPa	BD	BDa	BS
CHARACTERS							
○ IGF 716	37	36	34	30	30	28	30
○ IGF 2241 v	44	42	44	31	36	36	40
○ IGF 2242 v	38	42	40	34	36	34	38
• IGF 1915	38?	34	30	27	31	28?	30

Tab. 48

CHARACTERS	L	BP	DP	BPa	BD	BDa	BS
SPECIMENS							
○ IGF 716	28	34	25	28	23	23	—
○ IGF 2242 v	31	35	26	34	39	—	32

Tab. 49

CHARACTERS	L	B	Ba	Da	Ls	H
SPECIMENS						
○ IGF 716	—	—	—	—	28?	22?

symbols as in Tab. 18 (pag. 34)

strong and protruding; the teres major tubercle, instead, is hardly distinguishable. The coronoid fossa is shattered. The epicondyloid crest is blunt, but quite evident; ventrally it reaches a marked shelf-like structure of the epicondyle very similar to that seen in IGF 716. The epicondyle is strong, the epitrochlea, instead, is weak and modestly protruding over the olecranon fossa. The latter appears broad and deep.

Radius and ulna (Tabs. 9a, 9b)

Radius

Radius and ulna do not differ significantly from those already described.

The diaphysis of the radius enlarges regularly distalward and the distal epiphysis is not yet sealed with the diaphysis: two typical juvenile features.

The insertion rugosities for the ulna, on the rear face the radius, are slightly evident, while the transverse crest, though partly restored, seems quite prominent.

The summit of the olecranon is lacking.

Carpus (Tabs. 10-14 and 50)

The carpal bones show just trivial differences from those from Poggio al Pero.

The trapezoid is present; it is the only one kept at the Museum of Florence. Both dorsal and ventral articular surfaces are very concave in antero-posterior direction and latero-medially convex.

The dorsal facet is relative to the scaphoid and stretches medially joining a small, slightly convex surface for the trapezium. The ventral surface is relative to the second metacarpal bone.

In lateral view the dorsal and ventral surfaces appear connected by a broad, sinuous, weakly convex articular facet for the magnum.

Second metacarpal (Tab. 15)

The proximal half of the bone is missing. The distal epiphysis is not yet sealed with the diaphysis. The bone is very similar to the one from Poggio al Pero.

Third metacarpal (Tab. 16)

The diaphysis enlarges regularly distalward. The distal epiphysis is not yet sealed with the diaphysis.

No other substantial difference distinguishes this specimen from the one from Poggio al Pero.

Fourth metacarpal (Tab. 17)

Also in this metapodial the distal epiphysis is not yet sealed with the diaphysis.

No other important difference from the fourth metacarpal from Poggio al Pero can be remarked.

Phalanges (Tabs. 18-26)

The few phalanges of the hand are only a little bit smaller than the corresponding ones from Poggio al Pero.

Femur (Tab. 28)

The trocanter minor is mostly broken. The intertrocanterine line is rather more shifted dorsally than in the femurs from Poggio al Pero, and the line stretched vertically downwards from the intertrocanterine line is shifted more medially. The trocanter tertius is partly broken; it seems to be shifted just a little over the middle of the diaphysis and therefore it is a little more proximal than in the femurs from Poggio al Pero.

The rugosities of the outer gastrocnemius and of the plantaris-flexor digitorum are very marked and broad, while that of the inner gastrocnemius is rather reduced. The medial ligament insertion fossettes are rather evident.

The trochlea has strong and well sculptured lips; its trough is in form of an open V. In posterior view also the condyles appear strong and sculptured with a deep intercondyloid fossa in between.

In lateral view the popliteal fossette is shallow and shows a strong relief at its antero-dorsal margin. The lateral ligament insertion fossette is small and shallow.

In ventral view the popliteal fossette appears rather broad. The fossa extensoria is not very deep. The angle between the axis of the trochlear groove and the intercondyloid axis is of about 170°.

Tibia and fibula (Tab. 30)

The tibia is very similar to those, better to the right one, from Poggio al Pero. Its distal end, in medial view, is characterized by an evident, obliquely directed tendinous groove that housed the medial flexor digitorum.

Only the proximal half of the fibula is still present. Its diaphysis appears triangular in cross section. The medial face of the fibula is streaked by several longitudinal grooves.

Tarsus (Tabs. 31-37)

Astragalus (Tab. 31)

The medial antero-plantar edge of the bone is broken. On the whole it seems quite similar to the astragali from Poggio al Pero.

Also the other tarsal bones, the calcaneum, navicular and third cuneiform are very similar to those from Poggio al Pero.

Second metatarsal (Tab. 38)

The proximal epiphysis of the bone is wanting.

Third metatarsal (Tab. 39)

The bone seems rather similar to those from Poggio al Pero, but several articular surfaces are quite abraded.

Fourth metatarsal (Tab. 40)

The anterior articular surface at the antero-medial corner of the proximal epiphysis is subquadrate and the rear one is roundish.

Besides these insignificant differences the bone resembles those from Poggio al Pero rather closely.

At last, an almost complete right tarsus-metatarsus (IGF 731) of an adult *D. etruscus* individual from the Upper Valdarno makes part of the collections of the Museum of Florence. It consists of the astragalus, calcaneum, navicular, cuboid, third cuneiform and of the three metatarsals (the distal half of the fourth metatarsal is wanting). The single bones do not show any particular difference from the ones hitherto described.

Further postcranial elements of *D. etruscus* kept at the Museum of Florence.

The following data refer to fossil material from Olivola, Upper Valdarno and Mugello.

Humeri (Tab. 8; Pl. 5)

Twenty-one humeri.

Most rarely the coronoid fossa appears pierced, but this does not seem an original state, rather a consequence of bad preservation. The bones do not show significant differences from the humeri already described.

Radii/Ulnae (Tabs. 9a, 9b; Pl. 6)

Thirty radii and twenty-three ulnae.

Differences from the radii and ulnae already described are insignificant.

Carpus (Tabs. 10-14)

Scaphoids (Tab. 10)

Six scaphoids

Only very slight differences in the shape and extension of some articular surfaces distinguish these specimens from the ones already seen.

Semilunars (Tab. 11)

Three semilunars.

Same as for scaphoids.

Pyramidals (Tab. 12)

Four pyramidals.

Same as for scaphoids.

Pisiform and trapezium

None of these bones of the Tuscan *D. etruscus* are present in the collections of the Museum of Florence.

Magnums (Tab. 13)

Four magnums.

Same as for scaphoids.

Uncinates (Tab. 14)

Five uncinates.

Same as for scaphoids.

Second metacarpals (Tab. 15; Pl. 9, fig. 1)

Five metacarpals.

Differences from those already described are not diagnostic.

Third metacarpals (Tab. 16; Pl. 9, fig. 2)

Nine third metacarpals.

Same as for second metacarpals.

Fourth metacarpals (Tab. 17)

Nine fourth metacarpals.

Same as for second metacarpals.

The fourth metacarpals are generally in rather bad state of preservation.

Anterior phalanges (Tabs. 18-26)

Only one more phalanx of the hand, the first of the fourth finger (IGF 2240 v), is kept at the Museum of Florence.

Pelves (Tab. 27)

Six specimens of os coxae.

The pelvis is generally rather badly preserved, sometimes it is only represented by little fragments.

In medial view the ilium shows a smooth surface, without any or with a barely marked auricolar surface at the base of the sacral tuber. This character cannot be observed in the pelvis from Poggio al Pero since it is still articulated with a fragment of sacrum (see far above).

Differences from the pelvis from Poggio al Pero are insignificant.

Femurs (Tab. 28)

Seventeen femurs.

The angle between the axis of the trochlear groove and the intercondyloid axis ranges from about 167° to about 170°.

Other differences from the femurs already analysed are insignificant.

Tibiae/fibulae (Tab. 30; Pl. 8, fig. 1)

Fourteen tibiae and one fibula.

Trivial differences distinguish these specimens from the ones already described.

Tarsus (Tab. 31-37)

Astragali (Tab. 31; Pl. 8, fig. 2)

Ten astragali.

Again, differences from the astragali already seen are negligible.

Calcaneums (Tab. 32; Pl. 8, fig. 3)

Five calcaneums.

The articular surface located on the sagittal axis of the bone levelled with the sustentaculum tali and the surface on the sustentaculum tali itself may occasionally be fused together forming all a whole continuous surface (e.g. IGF 719 from the Upper Valdarno and IGF 1889 from Olivola).

Other differences from already described calcaneums are unimportant.

Naviculars

Two naviculars.

Negligible differences distinguish these bones from those already seen.

Cuboids

Three cuboids.

Same as for naviculars.

Third cuneiforms

Two third cuneiforms.

Same as for naviculars.

Tab. 50

CHARACTERS	L	I	II
SPECIMENS			
○ IGF 488 v ☐	36	26	32

symbols as in Tab. 10 (pag. 31)

Second metatarsals (Tab. 38)

Five second metatarsals.

Very slight, trivial differences may occasionally exist in the shape of the articular facets with respect to the already analysed specimens.

Third metatarsals (Tab. 39)

Six third metatarsals.

Same as for second metatarsals.

Fourth metatarsals (Tab. 40)

Five fourth metatarsals.

Same as for second metatarsals.

Posterior phalanges (Tabs. 41-49)

Eight phalanges.

The phalanges of the foot are very similar to the correspondent ones already seen.

Postcranial elements kept at the Paleontological Museum of Montevarchi

Most postcranial elements are shattered, fragmentary. The collection kept at Montevarchi is composed of: three humeri, one radius, one cubitus, one scaphoid, one semilunar, one femur, six tibiae, an almost complete right tarsus-metatarsus, one

Tab. 51

	OLIVOLA (physiol.)	OLIVOLA (non-physiol.)	UPPER VALDARNO (physiol.)	UPPER VALDARNO (non-physiol.)	*D. «etruscus brachycephalus»*	VOIGTSTEDT Kahlke (1965) (physiol.)
$\frac{\text{radius}}{\text{humerus}}$	.9723	.9581	.9338	.9806	.9942	1.040
$\frac{\text{III Mc}}{\text{humerus}}$	.5507	.5051	.5720	.5465	.5356	.5887
$\frac{\text{III Mc}}{\text{radius}}$	.5663	.5272	.6125	.5573	.5387	.5657
$\frac{\text{tibia}}{\text{femur}}$	—	—	.6878	.7961	.8421	.7280
$\frac{\text{III Mt}}{\text{femur}}$	—	—	.4032	.4032	.4250	.4297
$\frac{\text{III Mt}}{\text{tibia}}$	.6179	.5355	.5863	.5065	.5046	.5902
$\frac{\text{radius}}{\text{tibia}}$	1.1468	1.0675	1.0768	1.0225	1.0276	1.1510

calcaneum and one third metatarsal. These bones do not differ significantly from the ones kept at the Museum of Florence.

The most interesting specimen is the tarsus-metatarsus, registered as n. 17, glass case n.10. The site that provided this fossil is not specified. It belongs to a young individual. It is composed of the astragalus, calcaneum, navicular, cuboid, first, second and third cuneiforms, third and fourth metatarsals. The bones are badly preserved, abraded, probably as a result of transport; the medial half of the astragalus is lacking. The first cuneiform still shows the articular facet for the second cuneiform and second matatarsal, that is not preserved, instead, in the already described first cuneiform (IGF 716) kept at the Museum of Florence. The facet appears rectangular, dorso-ventrally stretched and slightly concave and is separated, by a sharp edge, from the round, flat dorsal articular surface for the navicular.

COMPARISONS AND GENERAL OBSERVATIONS

A great deal of European fossil rhinoceroses have been assigned to *Dicerorhinus etruscus* in the first half of this century. However, the lack of an up to date analysis of the type material of this species left many Authors without any reliable reference, which possibly gave rise to misattribution.

Hence the fossil remains of the Tuscan *D. etruscus* were compared with specimens that come from other stratigraphically equivalent sites, as well as with findings from both older and more recent sequences. Among the latter, just a brief mention will be made to *D. hemitoechus*, as a thorough analysis of this form will be accomplished in a near future.

A list of the main differences issued by the comparisons with the type material of *D. etruscus* is reported hereafter.

VILLAFRANCHIAN SPECIMENS POSITIVELY ATTRIBUTABLE TO *D. etruscus*

Of the forms accomodated in the species *D. etruscus* those from Leffe (Vialli, 1956) and Capitone (Ambrosetti, 1972), in Italy, and from St. Vallier (Viret, 1954), in France, actually resemble the Tuscan Early Pleistocene specimens quite closely.

The attribution to *D. etruscus* of the skull fragment from Leffe might perplex those who at first glance notice its unusually deep, concave dorsal profile. The specimen, however, is very incomplete and strongly damaged: its dorsal profile is just the result of crushing and bad restoration.

Concerning postcranial elements from Leffe, Capitone and St. Vallier slight differences in the extension of some articular surfaces or in the proportions of the epiphyses with respect to the Tuscan Early Pleistocene Dicerorhines may confidently be thought to be expression of population variability.

Skull n. 601 v from Senèze

This skull may confidently be accomodated in the *D. etruscus* stock, as the differences are such to be reasonably thought to fall within the range of population variability.

The size of this skull falls within the dimensional range of the Tuscan individuals.

Lateral view

The dorsal profile of n. 601 v is uniformly concave, as that of the Tuscan specimens; however the parietal outline is somewhat steeper and the point where the change of slope occurs is a little shifted backward.

The skull as a whole is slightly thicker, the nuchal crest is higher. The orbital cavity and, even more, the zygomatic arch are placed lower than in the Tuscan *D. etruscus*.

The toothrow seems slightly shifted backward: the front border of the orbital cavity levels the M1/-M2/ commissure. The narial notch is about as deep as that of IGF 756; instead, the ossification of the nasal septa is comparatively less advanced. The orbital cavity-narial notch distance is slightly smaller.

Dorsal view

The nuchal crest area is like in the Tuscan specimens, whereas the temporal ridges are more closely spaced. The zygomatic arches are less protruding. Also the frontals are narrower, while the breadth of the nasals is about the same.

Mandible n. 210958 from Senèze

I find that mandibles are not too good a tool for species discrimination in the case of European Plio-Pleistocene Dicerorhines, at least as far as qualitative characters are concerned. Moreover they are rarely complete, well preserved and even when they are they appear highly variable. Isolated jaws not associated with other diagnostic bony elements may be misleanding.

The mandible n. 210958 from Senèze was ascribed to *D. etruscus* by Guérin (1980). In spite of some differences from the mandibles from Tuscany, that however may be thought to fall within the range of variability of *D. etruscus*, this specimen may confidently be assigned to Falconer's species.

The size of the specimen falls within the range of values of the Tuscan *D. etruscus*.

Dorsal view

The horizontal rami appear slightly less divaricated. The symphysis shows a peculiar transverse constriction just behind the incisive area, unknown in the Tuscan specimens. However the symphysis area is rearely so well preserved, if preserved at all, in the Tuscan *D. etruscus* record to tell whether such a constriction may have been actually present or not.

The mandibular condyles are transversely arranged. The rear border of the symphysis levels the P/2-P/3 commissure.

Postcranial bones from Seneze assigned to *D. etruscus* by Schaub (1943) and Guérin (1980)

All size intervals match more or less with those of the Tuscan *D. etruscus* specimens.

Fore limb

Scapula

In ventral view the supraglenoid tubercle appears more salient and the coracoid process relatively more developed than in the Tuscan specimens.

Humerus

The medial lip of the trochlea is less developed than in the Tuscan specimens.

Radius

Bicipital tuberosity more dorso-ventrally stretched and slightly more distal than in the Tuscan forms.

Carpus

The only substantial difference from the Tuscan specimens is that the pyramidal is stronger, stout and more depressed.

Second metacarpal

The proximal epiphysis, in dorsal view, is clearly subtriangular, with a concave postero-medial border, while in the Tuscan forms it is semicircular, with a convex postero-medial border.

The articular surface for the third metacarpal is smaller than in the Tuscan specimens.

Third metacarpal

In lateral view the proximal epiphysis bears a wider anterior articular facet and a more reduced rear articular surface than in the Tuscan individuals.

Rear limb

Femur

In ventral view the medial lip of the trochlea is a little bit shorter than in *D. etruscus* from Tuscany and the angle between the intercondyloid axis and the axis of the trochlea is slightly smaller.

Tibia

The tibial tuberosity is much more developed, tougher than in the Tuscan specimens.

Tarsus

Astragalus

In dorsal view the axis of the trochlea is more medially inclined than in the Tuscan individuals and the distal margin of the trochlea is straight.

Other tarsal bones

In the form from Senèze, the dorsal articular surface of the cuboid is relatively more inclined forward than in the Tuscan specimens.

Third metatarsal

The rear process of the proximal epiphysis, in dorsal view, is straighter, less laterally bent than in the Tuscan specimens.

VILLAFRANCHIAN SPECIMENS NOT ASCRIBABLE TO *D. etruscus*

Dicerorhinus jeanvireti Guérin

Skull Vt. 627 from Vialette
(Holotype of the species)

The skull is far larger than those assigned to *D. etruscus*.

Lateral view

The dorsal profile of the skull is not uniformly concave as in *D. etruscus*: the parietal profile is quite steeper and the nuchal crest is higher and more projected backward. The point where the change of slope occurs along the dorsal surface of the skull is somewhat shifted backward with respect to *D. etruscus*. The occiput is not inclined forward as in the Tuscan specimens, but rather vertical on the occipital condyles.

The skull is comparatively thicker, the orbital cavity and the zygomatic arch are placed lower. The orbital cavity appears also relatively shifted backward, so that the postorbital portion of the skull is rather shorter than the muzzle if compared to *D. etruscus*. The zygomatic arch is broader and plunges downward more smoothly; as a matter of fact it does not show any distinct angle anterior of the glenoid area. The anterior border of the orbital cavity levels M2/, as happens in *D. etruscus*. The narial notch is much deeper and far wider than in *D. etruscus*; yet its rear border levels P3/ or the P3/-P4/ commissure, again as in *D. etruscus*. The distance between the orbital cavity and the narial notch is wider. From all this, the toothrow results comparatively shifted backward. The length of the toothrow is just hardly longer than in *D. etruscus*; nevertheless, compared with the general size of the skull, the toothrow appears proportionally quite shorter than that of *D. etruscus*. The diastema is longer. Also the ossification of the nasal septa seems relatively less advanced in *D. jeanvireti* than in *D. etruscus*; however, the skull from Dusino shows more extensively ossificated septa.

Another peculiarity of the skull from Dusino concerns its toothrow length, that falls perfectly within the range of values of *D. etruscus* and seems somehow less displaced backward than that of the type skull of *D. jeanvireti*, Vt. 627, from Vialette. As a matter of fact the front border of its orbital cavity overlies M3/, and the rear border of its deep and wide narial notch almost reaches the P4/-M1/ commissure.

Dorsal view

The sagittal notch of the nuchal crest is proportionally as deep as that of *D. etruscus*. The temporal ridges are closer spaced. The zygomatic arches are comparatively less divergent. The anterior border of the zygomatic processes of the temporals are straight, transverse to the skull and more advanced than in *D. etruscus*.

Again in terms of proportion to *D. etruscus* the frontals are narrower, while the nasals are about as broad. Alike *D. etruscus* behind the anterior hornbase rugosity a very weak constriction may be observed.

The zygomatic arches of the skull from Dusino protrude as those of *D. etruscus* and the front borders of the zygomatic processes of the temporals are slightly arcuated.

Occipital view

The occipital face of the skull from Dusino is trapezoidal and proportionally narrower than that of *D. etruscus*.

The nuchal crest shows a rather deep sagittal notch, while that of *D. etruscus* is straight or hardly concave.

Mandible n. V 377 from Vialette

The specimen is rather larger than those of *D. etruscus*.

Lateral view

The horizontal ramus appears proportionally as thick as in the *D. etruscus* mandibles, while the vertical ramus is longer and tends to get comparatively narrower dorsalward. The coronoid process is much more salient, while the sygmoidal notch is about as deep as in *D. etruscus*, but narrower. The angle between the two rami is slightly smaller. The diastema is longer than in *D. etruscus*.

Dorsal view

The horizontal rami are rather more divergent than in *D. etruscus*. The mandible condyles are more developed and diverge slightly outward and forward, whereas in *D. etruscus* they are transversal to the sagittal plane of the skull.

Owing to a more perpendicular vertical ramus the toothrow, longer than in *D. etruscus*, results more shifted to the back. The rear border of the symphysis levels P/2 or the P/2 P 3 commissure. All this, coupled with a longer diastema, suggests that the symphysis is not only longer in absolute, but also proportionally more extended than in *D. etruscus*.

Postcranial bones of *D. jeanvireti*

Fore limb

Scapula

(Comparisons with the missing parts of the scapula of the Tuscan *D. etruscus* were accomplished referring to those of the skeleton from Capitone, exposed at the Museum of the Institute of Geology and Paleontology of Rome).

The size measures of the scapulae of *D. jeanvireti* exceed the range of values of those of *D. etruscus*.

Compared with *D. etruscus*, the scapula of *D. jeanvireti* is broader and stouter.

In a front view of the scapula set vertically with the gleonoid cavity downward the tuber spinae scapulae is shifted more distally along the spine and points more downward than in *D. etruscus*. Furthermore the ideal line drawn from the distal border of the supraglenoid tuberosity to the ventralmost point of the border of the glenoid cavity is about transverse to the sagittal axis of the bone, while in *D. etruscus* the line is oblique to the sagittal axis. This suggests a different orientation of the scapula with respect to *D. etruscus*.

Humerus

Most size measures of the humeri of *D. jeanvireti* exceed the range of values of those of *D. etruscus*.

Compared with *D. etruscus*, the articular head is roundish, rather than subrectangular, and less jutting downward. The deltoid tuberosity is more proximal, while the teres major tubercle is relatively more distal along the shaft. The trochlea is proportionally narrower and its axis is less inclined outward than in *D. etruscus*.

In ventral view the olecranon fossa is comparatively narrower and deeper.

Radius

Most size measures of the radii of *D. jeanvireti* exceed the range of values of those of *D. etruscus*.

In front view the diaphysis is not as straight as in the radii of *D. etruscus*, but somewhat more arcuated, with lateral concavity.

The biceps tuberosity is broader and shifted more distally.

Ulna

Most size measures of the cubiti exceed the range of values of those of *D. etruscus*.

Alike the radius, the cubitus is more arcuated than in the Tuscan specimens. The olecranon is proportionally less developed and less inclined backward than in *D. etruscus*. The beak appears slightly more projected forward and downward.

Carpus

Most size measures of the carpal bones exceed the range of values of those of *D. etruscus*.

In proportion to the carpal bones of *D. etruscus* all those of *D. jeanvireti* but the magnum and uncinate are longer and narrower; the magnum, instead, is shorter and wider and the uncinate looks much like those of *D. etruscus*. The dorsal articular surfaces of most of these bones are comparatively less extended than in the Tuscan specimens.

Second metacarpal

Most size measures of the second metacarpals exceed the range of values of those of *D. etruscus*.

In dorsal view the proximal epiphysis shows a deeply concave postero-medial border and the dorsal articular facet is somewhat drop-shaped and does not cover all this face of the bone. On the contrary in *D. etruscus* the postero-medial border of the epiphysis is amply concave and the dorsal articular surface is expanded over almost all the dorsal face of the bone.

Third metacarpal

Most size measures of the third metacarpals exceed the range of values of those of *D. etruscus*.

The dorso-medial surface for the trapezoid is wider and faced more postero-medially than in *D. etruscus*.

In lateral view the two articular facets of the proximal epiphysis of the third metacarpal of *D. jeanvireti* are differently oriented than in *D. etruscus* and the anterior one is broader than the rear one, while in *D. etruscus* it is the opposite.

Fourth metacarpal

The size measures of the fourth metacarpals exceed the range of values of those of *D. etruscus*.

The two articular surfaces on the medial face of the proximal epiphysis are proportionally more expanded in *D. jeanvireti* than in *D. etruscus*; furthermore the anterior one is faced more downward in *D. jeanvireti* than in *D. etruscus*.

Rear limb

Femur

Most size measures of the femurs of *D. jeanvireti* exceed the range of values of those of *D. etruscus*.

The greater trocanter is proportionally less developed than in *D. etruscus* and comparatively less salient; on the contrary the lesser troncanter is more developed. The neck is stronger. Also the troncanter tertius, in front view, is tougher, a little more proximal and more curved upward than in *D. etruscus*. The diaphysis is a little straighter.

In ventral view the angle between the intercondyloid axis and that of the trochlea tends to be more ample in *D. jeanvireti*.

Tibia

Most size measures of the tibias of *D. jeanvireti* exceed the range of values of those of *D. etruscus*.

The tibial tuberosity is stronger, though less salient and more verging outward than in *D. etruscus*. The digital fossa is far deeper, while the popliteal incisure is proportionally narrower.

Tarsus

Astragalus

The size measures of the astragali of *D. jeanvireti* exceed the range of values of those of *D. etruscus*.

The axis of the trochlea is less verging outward than in *D. etruscus*.

In dorsal view the distal border of the trochlea is straight, while in *D. etruscus* it is strongly sinuous. The lips of the trochlea are proportionally less extended than in *D. etruscus*. The articular facet for the cuboid is comparatively less developed than in *D. etruscus*.

Calcaneum

The size measures of the calcaneums of *D. jeanvireti* exceed the range of values of those of *D. etruscus*.

D. jeanvireti is equipped with a more slender calcaneum than *D. etruscus*. The sustentaculum tali is relatively thinner and is placed in a more proximal position. The distal articular surface for the cuboid is proportionally far more developed than in the Tuscan specimens.

Other tarsal bones

Several measures of these bones of *D. jeanvireti* exceed the range of values of those of *D. etruscus*; however some size intervals overlap.

Significant differences from *D. etruscus* can be noted in the cuboid, that shows a stronger and relatively more angular rear process, and even more in the third cuneiform, that does not appear L-shaped as in *D. etruscus* having a barely developed rear process.

Second metatarsal

Several size measures of the second metatarsals of *D. jeanvireti* fall within the range of values of those of *D. etruscus*.

The proximal epiphysis of the second metatarsal of *D. jeanvireti*, in dorsal view, appears relatively less elongated than in *D. etruscus*, since its postero-medial border is less medially stretched. The dorsal articular surface is elongated and elliptical, while in *D. etruscus* it is shorter and bends medially at its rear end.

Third metatarsal

Most size measures of the third metatarsal of *D. jeanvireti* exceed the range of values of those of *D. etruscus*.

In dorsal view the proximal epiphysis has a straighter rear process.

On the lateral face of the proximal epiphysis the rear articular facet is lower than the anterior one (the opposite in *D. etruscus*) and is poportionally broader than in *D. etruscus*.

Fourth metatarsal

The size measures of the fourth metatarsals of *D. jeanvireti* exceed the range of values of those of *D. etruscus*.

The fourth metatarsals of the two species do not differ significantly in all but size.

Dicerorhinus miguelcrusafonti Guérin

Only the postcranial bones of this taxon are hitherto known.

Fore limb

Radius

All size measures but length exceed the range of values of the radii of *D. etruscus*.

The difference in extension of the two dorsal articular surfaces is far lesser than in *D. etruscus*; furthermore the lateral surface is roundish, while in *D. etruscus* it appears subelliptical to subrectangular.

The bicipital rugosity is broader and is shifted a little more distally.

Ulna

The proximal articular surface is proportionally broader than in *D. etruscus*.

Carpus

The size measures of the carpal bones of *D. miguelcrusafonti* exceed the range of values of those of *D. etruscus*.

Except for size perhaps the most significant difference from *D. etruscus* is that the ventral articular surface of the magnum is less stretched longitudinally than transversely.

Second metacarpal

Most size measures of the second metacarpals of *D. miguelcrusafonti* exceed the range of values of those of *D. etruscus*; a few, however, fall within such intervals.

The dorsal and lateral articular surfaces of the proximal epiphysis are proportionally narrower than in *D. etruscus*.

Third metacarpal

Most size intervals of the third metacarpals of the two species overlap.

In dorsal view the rear process is proportionally less extended than in *D. etruscus*. The diaphysis is wider.

Fourth metacarpal

All size measures, but length, exceed the range of values of the fourth metacarpals of *D. etruscus*.

The articular surfaces on the medial face of the proximal epiphysis are fused together (in *D. etruscus* they are separated) and the rear one is proportionally shorter than in the fourth metacarpal of *D. etruscus*.

Rear limb

Tarsus

Astragalus

The size measures of the astragali of *D. miguelcrusafonti* exceed the range of values of those of *D. etruscus*.

The collum tali, in *D. miguelcrusafonti*, is proportionally longer than in *D. etruscus*; the tubercle on the medial side of the caput tali is more spaced from the distal border of the trochlea than in the Tuscan specimens.

In distal view the caput tali is less twisted with respect to the trochlea than in *D. etruscus*.

Calcaneum

The bone is a little longer and more massive than in *D. etruscus*.

In dorsal/plantar view the sustentaculum tali is less oblique than in *D. etruscus*.

Other tarsal bones

Some size measures of these bones exceed the range of values of those of *D. etruscus*; a few, however fall within such size intervals.

Except for size, the only significant differences between the distal tarsal bones of the two species are that the dorsal surface of the cuboid appears much more inclined forward in *D. miguelcrusafonti* than in *D. etruscus* and that the third cuneiform of *D. miguelcrusafonti* has a comparatively less developed and more laterally inclined posterior process, so that the bone, in dorsal and ventral view, is not characteristically L-shaped as in *D. etruscus*, but V-shaped.

Second metatarsal

All size intervals of the second metatarsals of *D. miguelcrusafonti* overlap those of *D. etruscus*, but most size measures exceed the range of values of Falconer's species.

On the lateral face of the proximal epiphysis the rear articular surface is proportionally quite broader in *D. miguelcrusafonti* than in *D. etruscus*.

Third metatarsal

All size measures slightly exceed the range of values of the third metatarsals of *D. etruscus*.

In dorsal view the rear process of the proximal epiphysis is far less bent laterally than in *D. etruscus*.

The two articular facets on the medial face of the epiphysis are fused together (in *D. etruscus* they are separated) and quite wider than in *D. etruscus*.

Dicerorhinus beliajevi Sharapov
(Holotype of the species)

The rhinoceros from the Afghan-Tadjik Depression represents a rather small, but sturdy animal that Sharapov (1986) described as a new Dicerorhine species, *D. beliajevi*. Unfortunately the taxon was established on very slender evidence: few upper cheek teeth, several elements of a fore limb and one tibia. Nevertheless the differences from the small but light, slender *D. etruscus* are immediately apparent just as well. All limb segments of *D. beliajevi* are shorter than those of *D. etruscus* and have rather thick proximal epiphyses and diaphyses and, instead, surprisingly slim distal epiphyses.

Carpal bones of *D. beliajevi* are proportionally wider than those of *D. etruscus*.

Dicerorhinus yunchuchenensis Chow Ben-Shun
(Holotype of the species)

This Chinese finding, dated to the Villafranchian, was properly distinguished from *D. etruscus* by Chow Ben-Shun (1963b). As a matter of fact it differs significantly from the Tuscan forms in a great deal of characters, and yet certain affinities might denote some kind of relationship with the *D. etruscus* stock. However according to Chow Ben-Shun *D. yunchuchenensis* represents an evolutionary stage more primitive than *D. choukoutienensis* "corresponding to the Villafranchian D. etruscus". I agree with the first statement, but not with the second; in my opinion *D. yunchuchenensis* is more evolute than *D. etruscus*.

The skull is far larger than those from Tuscany.

Lateral view

The dorsal profile of the specimen is not complete, as part of the parieto-occipital region was not preserved. However the remnants of this region suggest that the parietal profile was probably steeper than in *D. etruscus*; the point where the change of slope occurs along the dorsal surface of the skull is rather more shifted backward. The front hornbase rugosity is far more prominent than in *D. etruscus*. The skull is proportionally very much thicker, it appears tremendously massive. The orbital cavity is placed comparively lower and is more shifted to the back. The zygomatic arch is broad, very powerful. Just in front of the glenoid area it plunges forward and downward; rostrally, it stretches almost horizontally forward. This peculiar pattern of the zygomatic arch is rather uncommon. The narial notch is deeper and wider than that of *D. etruscus*, while the ossification of the nasal septa is proportionally less advanced. The toothrow seems displaced backward. The anterior border of the orbital cavity levels M2/, the rear border of the narial notch the P3/-P4/ commissure.

The retroarticular and jugular processes are more shifted backward than in *D. etruscus*.

Dorsal view

The temporal ridges are more closely spaced than in the Tuscan specimens. The zygomatic arches seem comparatively to protrude like in *D. etruscus*, while the frontals are proportionally narrower. The nasals are far more expanded; they show what I call a typical "arrowhead" pattern.

Ventral view

The choanae seem proportionally shifted to the back with repect to *D. etruscus*. The costriction of the sphenoidal region is of about the same degree as in *D. etruscus*.

Skull n. 96129 from Senèze

This skull is reported as *D. etruscus* by Guèrin (1980).

In my opinion it is rather far from the Tuscan *D. etruscus* stock; a great number of differences admonish to keep the specimen distinct.

The size of the specimen falls within the dimensional range of the Tuscan individuals.

Lateral view

The skull as a whole is massive and extremely thick. The dorsal profile is not smoothly concave: a very prominent frontal swelling occurs, absolutely unknown in the Tuscan *D. etruscus*.

Also the nasal hornbase is rather more protruding. The nuchal crest is quite higher and more extended backward. The orbital cavity is placed lower and is shifted backward, compared to the Tuscan specimens. The zygomatic arch is extremely thicker and does not show any distinct angle anterior of the glenoid area.

The narial notch is much deeper and wider; the ossification of the nasal septa, on the contrary, is less advanced than in *D. etruscus*.

The toothrow length falls within the range of values of the Tuscan forms; yet it appears shifted backward (the diastema is longer) and is even rather more inclined donward, moving to the back. The front border of the orbital cavity levels the M2/-M3/ commissure, while the narial notch levels the P3/-P4/ commissure. The orbital cavity-narial notch distance is smaller than in *D. etruscus*.

Mandible n. 298 from Vallonet

Guèrin (1980) assigned this specimen to *D. etruscus brachycephalus*. I find that the mandible is too fragmentary for any sure attribution. What remains of the vertical ramus suggests that the angle between the two rami might have veen a little bit wider than in the Tuscan *D. etruscus*. In spite of this the mandible could possibly belong to an individual somehow related to *D. etruscus*.

Postcranial bones, from several Villafranchian
and Post-Villafranchian localities,
ascribed to *D. etruscus brachycephalus*
by Guèrin (1980)

The postcranial elements that Guérin (1980) assigned to *D. etruscus brachycephalus* indeed recall those from Tuscany in a great deal of characters. Guérin reports quite an amount of measurements, sample means and variation coefficients. However he did not provide the measures of the single specimens, but rather grouped them up into size intervals, so that, unfortunately, the exact proportions of the bones are not inferable. Anyhow the lowest values of the size intervals of the *D. etruscus brachycephalus* postcranial elements overlap the highest values of those of the Tuscan *D. etruscus* specimens. Moreover the two forms really do share some characters. On the whole we have a combination of circumstances quite similar to those that we will see regarding the fossils from Süssenborn and Voitgstedt. Therefore the specimens assigned to *D. etruscus brachycephalus* by Guérin likely belong to individuals closely related to the Tuscan *D. etruscus* stock.

Nevertheless qualitative differences from Falconer's species seem such that a distinction at the specific level may be advocated for these specimens attributed to *D. etruscus brachycephalus*.

Ranking is matter of points of view, of course. If further, more detailed comparisons will point out that the discrepancies between the two forms are not enough to justify the establishment of a new species, I anyhow believe that the use of the subspecific name "brachycephalus" is misleading, since it was introduced by Schroeder (1903) to indicate a subspecies of *D. kirchbergensis* (mercki). The name was assigned to the skull from Daxlanden, which thus represents the type specimen of the subspecies. Guérin (1980) did not distinguish this skull from others, as, for example, Mainz 1958/764 from Mosbach or the one figured by Schroeder (1903) in tab. 1 fig. 1, again from Mosbach. According to me, instead, the skull from Daxlanden has no relation with these latter specimens. Moreover no postcranial bone was found associated with the skull from Daxlanden, so that nothing is known about the limb bones of "*D. mercki brachycephalus*". Consequently any attribution of postcranial elements to "*brachycephalus*" is arbitrary. Now, if the assignement of skulls to *D. etruscus brachycephalus* is matter of debate, as testified by literature, although a type specimen does exist, even more should be the assignement of postcranial elements.

Fore limb

Scapula

In ventral view the supraglenoid tubercle is far more salient and the coracoid process more developed than in *D. etruscus*.

Humerus

The olecranon fossa is proportionally narrower than in *D. etruscus*; in ventral view it has a semicircular outline and is deep, while in the Tuscan specimens it appears in form of a wide and shallow arch.

Again in ventral view the lips of the trochlea converge rapidly towards the olecranon fossa, whereas in *D. etruscus* they keep quite more spaced.

Radius

The bicipital tubercle is proprtionally less expanded and is more distal than in *D. etruscus*.

Carpus

The carpal bones are more massive and comparatively less elongated (e.g. the scaphoid) than in the Tuscan individuals.

Second metacarpal

In dorsal view the proximal epiphysis is somewhat V-shaped, because of its deeply concave lateral margin, and the dorsal articular surface is not very expanded, while in *D. etruscus* the lateral margin of the proximal epiphysis is almost straight and the dorsal articular surface is proportionally broader.

Furthermore, in lateral view, the anterior articular facet of the proximal epiphysis is proportionally narrower than in *D. etruscus*.

Third metacarpal

In lateral view the front edge of the proximal epiphysis is less protruding than in *D. etruscus*, so that the anterior articular surface results relatively lowered. Furthermore this latter surface is about as wide as the rear one, while in *D. etruscus* is markedly smaller than the rear one. Finally, the rear articular surface is somewhat triangular-shaped, whereas in *D. etruscus* it appears more subrectangular.

Fourth metacarpal

The dorsal articular facet, in dorsal view, is far more expanded than in *D. etruscus*.

In medial view the two articular facets of the proximal epiphysis are quite broader and proportionally closer spaced than in *D. etruscus*.

Rear limb

Femur

In ventral view the medial lip of the trochlea appears comparatively less protruding than in *D. etruscus*.

The angle between the axis of the trochlea and the intercondyloid axis is about the same as in *D. etruscus*.

Tibia

The tibial tuberosity is proportionally reduced, less robust and less projected outward than in *D. etruscus*. Also the poplitear incisure is proportionally narrower than in *D. etruscus*.

Astragalus

In dorsal view the axis of the trochlea is a little more inclined medially and the lips of the trochlea are proportionally more spread apart than in *D. etruscus*.

In distal view the caput tali is less twisted relatively to the trochlea than in the specimens from Tuscany.

Navicular.

The bone is broader and stronger than in *D. etruscus*.

Cuboid

In lateral/medial view the corpus of the bone is proportionally thinner, while its rear process is more elongated backward and downward than in *D. etruscus*.

In front view the dorsal surface slopes more medially than in the cuboids from Tuscany.

In dorsal view the dorsal articular facet is broader.

Second metatarsal.

The dorsal articular surface is proportionally more expanded than in *D. etruscus*.

In lateral view the anterior articular facet of the proximal epiphysis is roundish and smaller than the rear one, which appears triangular; in *D. etruscus* both are subrectangular to subelliptical and of the same extension.

Third metatarsal

In dorsal view the rear process of the proximal epiphysis bends less outward than in *D. etruscus*.

In lateral view the anterior articular surface of the proximal epiphysis is more expanded than in the Tuscan specimens, while the rear one is proportionally smaller and narrower.

Fourth metatarsal

In lateral view the proximal epiphysis shows an anterior articular surface proportionally narrower than in *D. etruscus*, while the rear one is somewhat shifted downward and more expanded compared with the Tuscan specimens.

POST-VILLAFRANCHIAN SPECIMENS

Skull from Stirone

This specimen was assigned to *D. hemitoechus* by Cigala Fulgosi (1976).

The size of the skull exceeds the size range of the Tuscan *D. etruscus* specimens.

Lateral view

The dorsal profile of the fossil is typically concave, deep. The parietal profile is very steep and the point that marks the change of slope is quite shifted to the back compared with *D. etruscus*.

The skull as a whole appears thick, massive. The orbital cavity is slightly shifted to the back with respect to *D. etruscus*; its front border overlies M2/. The zygomatic arch plunges downward closer to the glenoid area than in *D. etruscus*. The narial notch is narrow and much deeper than in the Tuscan specimens; its rear border overlies the rear half of P4/. The toothrow appears a little shifted backward compared with *D. etruscus*. The narial notch-orbital cavity distance is proportionally shorter than in the Tuscan specimens. The ossification of the nasal septa is comparatively of the same degree as in *D. etruscus*.

Dorsal view

In this view the skull from Stirone appears more slender than the Early Pleistocene ones from Tuscany. The nuchal crest and the nasals are sculptured like in *D. etruscus*. Also the temporal ridges appear proportionally spaced like in *D. etruscus*; the straight zygomatic arches, instead, are far less divergent.

Affinities indeed grow if we compare the skull from Stirone with the one from Grezzano. We already emphasized that the dorsal profile of the latter might even be unnatural; yet we could be tempted to give more credit to this character of the specimen from Grezzano on account of the almost coincident values for cranial angle n between the two forms.

In dorsal view the two skulls look quite alike, except for size. Both appear slender and show less divergent zygoma than typical *D. etruscus* specimens.

Skull Suss. 1965/2513 from Süssenborn

This skull was assigned to *D. etruscus* by Kahlke (1969). I do not agree with such an attribution: the animal was indeed rather closely allied to *D. etruscus*, maybe even a late progressive descendant of this species. But some differences are so marked that I find more convenient to distinguish it from the species of Falconer, possibly naming it *Dicerorhinus* ex gr. *D. etruscus*, awaiting for further investigation.

The skull is far larger than IGF 756, that is the largest of the Tuscan *D. etruscus* specimens known till now.

Lateral view

The dorsal profile of the fossil from Süssenborn is uniformly concave, as that of the typical *D. etruscus* specimens. Also the thickness of the skull as well as the vertical position of the orbital cavity are proportionally the same; the latter is just slightly displaced backward. Not much remains of the zygomatic arch; yet it seems proportionally of about the same thickness and comparatively placed at the same height as in the Tuscan forms.

The narial notch is very much deeper and wider than in the typical *D. etruscus*. In proportion the toothrow is remarkably shorter (its length falls within the range of values of the Tuscan specimens), though not shifted backward, while the diastema is far longer. The anterior border of the orbital cavity is in about the same position, relatively to the toothrow, as in *D. etruscus*, while the posterior border of the narial notch levels the P4/-M1/ commissure. The nasal septa are more extensively ossified than those of *D. etruscus*.

The toothrow lengths of Suss. 1964/680, Voi. 3280, Mosb. 1965/172, Suss. 1964/666 reported by Kalke (1969) fall within the range of values of the Tuscan specimens.

Mandible Suss. 1964/672 from Süssenborn

The size of the specimen seems to fall within the range of values of the *D. etruscus* mandibles from Tuscany.

It is badly preserved. Kahlke (1969) assigned it to *D. etruscus* and indeed no evidence seems to contrast with such opinion.

The toothrow length falls within the range of values of the Tuscan *D. etruscus*. The horizontal rami seem just a little more divaricated. The only true difference is that the posterior border of the symphysis levels P/3, which means that either the symphysis is longer or the toothrow is slightly shifted forward with respect to the Tuscan individuals.

Mandible Suss. 1964/671 from Süssenborn

Also this specimen was assigned to *D. etruscus* by Kahlke (1969).

We can repeat the considerations already made for the previously seen mandible. However in this case the rear border of the symphysis levels the P/2-P/3 commissure, which makes this specimen even closer to *D. etruscus* than Suss. 1964/672.

Mandible Suss. 1964/678 from Süssenborn

Kahlke (1969) ascribed also this third specimen to *D. etruscus*. Again size and toothrow length fall within the range of values of the Tuscan *D. etruscus*. The rear border of the symphysis levels P/2 and is therefore a little more shifted forward than in Suss. 1964/671 and Suss. 1964/672.

Of the toothrow lengths reported by Kahlke (1969) those of Mosb. 1955/1339, Mosb. 1966/106, Mosb. 1958/560, Suss. 1964/686, Suss. 1964/668, Suss. 1964/675, Suss. 1964/676, Suss. 1964/673, Suss. 1964/328, Suss. 1964/682 and Suss. 1964/325 fall within the range of values of the Tuscan specimens. On the contrary those of Suss. 1965/2597 and Voi. 3280 have a longer P/2-P/4 length than *D. etruscus*, while their M/1-M/3 length is in the range of values of *D. etruscus*; Mosb. 1956/920 has a shorter P/2-P/4 length than *D. etruscus*, while its M/1-M/3 length is in the range of values of *D. etruscus*; Suss. 1964/669, Suss. 1964/679, Suss. 1964/327 and most of all Suss. 1964/678 have toothrow lengths that exceed the toothrow length range of the *D. etruscus* from Tuscany.

Postcranial bones from Süssenborn assigned to *D. etruscus* by Kahlke (1969) and to *D. etruscus brachycephalus* by Guérin (1980)

Most of the bones are larger than those of the Tuscan *D. etruscus*; however a few of them, such as some basipodials, the tibia etc., have some dimensions that fall within the range of values of the Tuscan specimens. Furthermore in several cases the bones show proportions similar to those of the Tuscan specimens. The evidence therefore suggests that the form from Süssenborn might be a late progressive relative of the typical *D. etruscus* from Tuscany. This is consistent with Guérin's thought, although I am convinced that the specimens from Süssenborn can be easily referred even to a new species. Anyhow in case differences are not judged to be more than of subspecific standing, I disagree with Guérin for the choice of the name «brachycephalus» for the reasons already exposed.

Fore limb

Humerus

The deltoid tuberosity seems shifted more distally than in *D. etruscus*. The trochlea is proportionally reduced, the olecranon fossa is slightly deeper and more stretched outward. The tubercle along the epicondyloid crest is less prominent than in *D. etruscus*.

Radius

The bone appears more arcuated inward in front/rear view. The epiphysis seems proportionally enlarged.

Second metacarpal

In lateral/medial view the bone is clearly more arcuated forward than the second metacarpals from Tuscany.

Rear limb

Tarsus

Astragalus

The axis of the trochlea, in dorsal view, is much more inclined outward than in *D. etruscus*.

Skull Voi. 67 from Voigtstedt

Kahlke (1965) attributed also this skull to *D. etruscus*. Even more than the previously seen skull, this specimen shows such a number of differences from the typical *D. etruscus* individuals that, in my opinion, it is more convenient to keep it distinct from the species.

The fossil suffered rather strong deformation. The skull is larger than the Tuscan specimens.

Lateral view

The dorsal profile of the skull is probably quite affected by deformation; it appears more concave than that of the *D. etruscus* individuals, the parietal region is much steeper and the point where the change of slope occurs between the neural and the facial portion of the skull is very shifted to the back. The nuchal crest is proportionally lower and hardly more projected backward. The nasal hornbase area seems more prominent, compared to *D. etruscus*.

Owing to crush, the skull appears abnormally depressed, flattened. Also the orbital cavity seems somewhat dorso-ventrally squeezed; anyhow it appears comparatively displaced backward and slightly placed lower than in *D. etruscus*, but its relative vertical position within the skull may be affected by deformation. The narial notch is extremely deeper and wider than that of *D. etruscus*. The ossification of the nasal septa seems comparatively less advanced. The orbital cavity-narial notch distance is proportionally smaller. The zygomatic arch is placed lower, if not affected by deformation; it plunges forward and downward blandly and thus does not show any distinct angle anterior of the glenoid area. The jugular process seems somewhat retracted, closer to the occipital condyles. The retroarticular process is slighlty shifted backward as well and more straight.

Dorsal view

The nuchal crest area is structured like in *D. etruscus*. The temporal ridges are more closely spaced. The zygomatic arches were probably less protruding, while the frontals are proportionally broader. The nasals are strongly expanded, with an extremely developed hornbase rugosity and an abrupt rear constriction. They have an "arrowhead" appearance; a so conformed nasal area is unknown in the Tuscan *D. etruscus* specimens.

The toothrow lengths of Suss. 4404, Suss. 7143, Suss. 9076, Voi. 3279, Voi. 81, Voi. 70, Voi. 217 reported by Kahlke (1965) fall within the range of values of the Tuscan *D. etruscus* specimen.

Mandible Voi. 1127 From Voigtstedt

Kahlke (1965) assigned this specimen to *D. etruscus*. Unfortunately it is incomplete, which makes comparisons rather difficult. The horizontal rami were probably a little more divergent than in the Tuscan specimens. The toothrow length falls within the range of values of the Tuscan *D. etruscus*. What remains of the vertical ramus might suggest that the angle formed with the horizontal ramus were possibly wider than in *D. etruscus* mandibles. The rear border of the mandibular symphysis seems to level P/2.

I think that the specimen actually possesses several characters that recall those of the Tuscan *D. etruscus* mandibles, but in my view the attribution of this incomplete specimen to Falconer's species might not be conclusive.

Of the toothrow lengths reported by Kahlke (1965) those of Suss. 7169, Suss. 9075, Suss. 7144, Suss. 6679, Voi. 1137, Voi. 121, Voi. 122 fall within the range of values of *D. etruscus*, while those of Suss. 687 and Suss. 6605 exceed such a range of values.

Postcranial bones from Voigtstedt assigned to *D. etruscus* by Kahlke (1965) and to *D. etruscus brachycephalus* by Guérin (1980)

Like the specimens from Süssenborn the postcranial elements from Voigtstedt are generally larger than the Tuscan specimens, even though most of them are remains of young individuals. However, again as for the specimens from Süssenborn, some bones, e.g. humerus, ulna, magnum, tibia, few metapodials etc., actually have a few dimensions that fall within the range of values of the *D. etruscus* material from Tuscany. Sometimes even their proportions are similar. Therefore also the forms from Voigtstedt are probably closely allied to *D. etruscus*, from which they possibily derived. Hence the considerations set forth concerning the specimens from Süssenborn may likewise pertain to those from Voigtstedt.

Fore limb

Scapula

The scapula, in front/rear view, is broader than that of Falconer's form. Also its neck is rather larger.

Humerus

The difference in breadth between the diaphysis and the distal epiphysis is increased with respect to *D. etruscus*. The teres major tubercle is shifted more distally.

Radius

The diaphysis is somewhat more arcuated than in *D. etruscus*. The epiphyses are larger.

Second metacarpal

The lateral articular surfaces of the proximal epiphysis are proportionally narrower than in *D. etruscus*.

Third metacarpal

The bone is more slender than in the Tuscan specimens.

Fourth metacarpal

The diaphysis is straighter than in *D. etruscus*.

Rear limb

Astragalus

In dorsal view the distal margin of the trochlea is more rectilinear, less sinuous than in *D. etruscus*.

In medial and distal view the medial lip of the trochlea is more depresssed.

Navicular

In front view the medial and lateral flanks of the bone appear convex and not concave as in *D. etruscus*.

Fourth metatarsal

The diaphysis is straighter than in *D. etruscus*.

Skull from Mosbach, figured by Schroeder (1903), Tab. 1, Fig. 1

Also this specimen, assigned to *D. etruscus* by Schroeder (1903), ought to be distinguished from this species.

The size of the skull falls within the dimensional range of the Tuscan *D. etruscus* forms.

Lateral view

The dorsal profile of the fossil is not complete, as part of the occipital region of the skull misses. However the parietal profile is steeper and the remnants of the occipital region suggest that the nuchal crest was probably higher and more projected backward than in the Tuscan specimens. Nevertheless the change of slope along the dorsal surface of the skull from Mosbach takes place in about the same position as in the typical *D. etruscus* specimens.

The skull as a whole is markedly thicker and more massive than in *D. etruscus*. The orbital cavity is placed lower, so as the zygomatic arch, that plunges smoothly downward and forward without any evident angle in front of the glenoid area. The narial notch is far deeper and tremendously wider than that of *D. etruscus*, while the ossification of the nasal septa is of about the same degree.

The toothrow is longer, more arcuated and more displaced backward, so that the diastema results somewhat lengthened. The anterior border of the orbital cavity levels more or less the M2/-M3/ commissure, whereas the rear border of the narial notch overlies M1/. The orbital cavity-narial notch distance is far smaller than in *D. etruscus*.

Dorsal view

The temporal ridges are about as spaced as those of the Tuscan *D. etruscus* specimens. The frontals are broader, while the nasals are of about the same breadth.

Skull from Mosbach figured by Schroeder (1903), Text-Fig. at pag. 33

This other skull from Mosbach, represented in sole occipital view, was also assigned to *D. etruscus* by Schroeder. However it differs significantly from the typical *D. etruscus* specimens for its size and for its general outline, that is clearly trapezoidal.

Skull Mainz 1958/764 from Mosbach

This specimen was attributed to *D. etruscus* by Loose (1975) and to *D. etruscus brachycephalus* by Guérin (1980); however the skull counts quite an amount of differences that distinguish it from the Tuscan forms. It may represent a descendant of the *D. etruscus* stock, as supposed by Guérin (1980), since it indeed shows some affinities with the latter species; but differences undoubtly outnumber similarities so much to possibily justify the establishment of a new species. Guérin judges the discrepancies from *D. etruscus* enough for distinguishing the specimen at the sole subspecies level; ranking is matter of subjective conviction, we already said. Anyhow, I find the choice of the subspecifical name "brachycephlus" misleading, as this name pertains, rightfully or not, to the skull from Daxlanden (see below), which shows only very remote affinities with this skull Mainz 1958/764 from Mosbach. Therefore a more fitting subspecific name should be chosen.

The skull is far larger than those from Tuscany.

Lateral view

The dorsal profile of the skull is less uniform than that of the typical *D. etruscus* specimens; the nuchal crest is proportionally higher, the parietal profile is relatively steeper and the change of slope takes place more backward. The skull is comparatively thicker, more massive than that of *D. etruscus*. The orbital cavity is placed lower and is more shifted to the back. Also the zygomatic arch is placed lower and plunges downward and forward with a less evident angle. The narial notch is much deeper and more ample, while the ossification of the nasal septa is proportionally as advanced as in *D. etruscus*. The orbital cavity is comparatively closer to the narial notch. On account of a proportionally shorter but not back-shifted toothrow the diastema results relatively elongated. The anterior border of the orbital cavity overlies the M/2-M/3 commissure, while the rear border of the narial notch levels the M1/-P4/ commissure. The retroarticular process is less inclined forward than in *D. etruscus*.

Dorsal view

In proportion to *D. etruscus* the nuchal crest is slightly broader, while its sagittal notch is about as deep. The temporal ridges are more widely spaced. The zygomatic arches are less projected outward. The frontals are proportionally of about the same breadth. The nasals are "arrowhead"-shaped, that is, extremely more expanded than in *D. etruscus*

Occipital view

Again in proportion to *D. etruscus* the skull from Mosbach appears quite higher and narrower; the occiput is trapezoidal. The arrangement of the zygomatic processes of the temporals is like in *D. etruscus.*

Mandible from Mosbach figured by Schroeder (1903), Text Fig. pag. 72

The mandible is quite larger than those from Tuscany. The ventral profile of its horizontal ramus is slightly more convex than in the typical *D. etruscus* jaws; the vertical ramus is proportionally much narrower. The angle between the two rami is slightly smaller than in *D. etruscus.*

The toothrow length exceeds the range of values of *D. etruscus.* Also the diastema is longer.

Schroeder assigned the specimen to *D. etruscus,* but the attribution is doubtful in my opinion.

Mandible from Mosbach figured by Schroeder (1903), Tab. 11, Fig. 2 and Tab. 12, Fig. 1

Like the previously seen mandible, this specimen is larger than the jaws from Tuscany.

The horizontal ramus shows a comparatively more convex ventral profile than the Tuscan specimens and the vertical ramus is proportionally narrower.

The toothrow is longer, as well as the diastema and the symphysis, whose rear border levels P/3. The incisive portion of the mandible, in dorsal view, is strongly enlarged just behind its frontmost margin; this is unknown so far in *D. etruscus.* The mandibular condyles, again in dorsal view, are stouter and not trasversely elongated as in *D. etruscus,* but rather inclined inward and backward.

Skull from Tiraspol GIKMK n. 9179

Nikiforova *et al.* (1971) assigned this skull to *D. etruscus.* Indeed the animal must have been closely related to the species of Flaconer, with which it shares a great deal of characters. Nevertheless some features are unknown in *D. etruscus;* hence I would find advisable, provisionally, to indicate this specimen as *Dicerorhinus* ex gr. *etruscus.*

The dimension of the skull falls within the size range of the Tuscan *D. etruscus* forms.

Lateral view

The dorsal profile of the specimen is grossly that of a typical *D. etruscus* individual; the point where the change of slope occurs is perhaps just slightly shifted backward. The nuchal crest is a little bit higher and more projected backward, but the occipital face of the skull is inclined forward in about the same way as in the Tuscan specimens.

The anterior hornbase rugosity and the rear hornbase swelling are more protruding than in *D. etruscus.* The skull as a whole is thicker. The orbital cavity is comparatively displaced backward and lower. The zygomatic arch is placed lower as well and is about as thick; it bends downward and forward less abruptly, so that it forms a less marked angle of plunge as compared with the Tuscan *D. etruscus* individuals.

The narial notch is extremely deep, but low, narrow. The orbital cavity-narial notch distance is very much reduced with respect to *D. etruscus.* The toothrow seems slightly shifted backward. The anterior border of the orbital cavity levels M2/ as in the Tuscan forms, while the rear border of the narial notch overlies M1/.

The nasal septa are comparatively a little less ossified than in *D. etruscus.*

Dorsal view

The outline of the nuchal crest of the skull from Tiraspol is rather similar to that of the Tuscan *D. etruscus* specimens. The temporal ridges, instead, are more closely, spaced. The zygomatic arches are straight, but far less divergent than in *D. etruscus.* Also the frontals are narrower. The nasals are about as wide as in the Tuscan specimens; however they show an embryonic tendency toward an "arrowhead" pattern.

Ventral view

The anterior border of the choanae levels the M/2-M/3 commissure, as in the Tuscan individuals.

The sphenoidal region of the skull from Tiraspol appears slightly less constricted than in the typical *D. etruscus* specimens.

Mandible OPS n. 1/335 from Tiraspol

The specimen is too incomplete for any reliable comparison. Nikiforova *et al.* (1971) ascribed it to *D. etruscus* and indeed the size and the general aspect of this mandibular fragment might recall the specimens from Tuscany.

Skull from Daxlanden

This renown fossil has been ascribed to several different species: Meyer (1864) called it *Dicerorhinus mercki,* Schroeder (1903) *D. mercki* var. *brachycephala* (as successively did Mayer, 1971), Loose (1975) *D. kirchbergensis* and, at last, Guérin (1980) *D. etruscus brachycephalus.* Schroeder (1903) considered this specimen a transitional form between *D. etruscus* and *D. mercki.* Azzaroli (1963b) disagreed, enumerating a list of differences that exclude any relationship with the *etruscus* stock; on the contrary, Azzaroli acknowledged some affinities with *D. mercki* in the Daxlanden skull, thus dubitatively attributing it to some primitive variety of the latter species. Loose (1975) was resolute in ascribing the specimen to *D. kirchbergensis,* as the differences in length, in his view, are not so limiting.

According to me, the skull from Daxlanden indeed counts such a number of significant differences from the typical *D. etruscus* individuals that a possible relationship with the latter species seems unlikely, whilst it does show quite a number of affinities with *D. kirchbergensis* (mercki).

The size of the specimen falls within the dimensional range of the Tuscan *D. etruscus* individuals.

Lateral view

The dorsal profile of the skull from Daxlanden is not uniformly concave as that of *D. etruscus*: its neural portion is somewhat more uplifted (the cranial angle p seems wider), so that the parietal profile results steeper (angle n is smaller). The point where the change of slope occurs along the dorsal surface of the skull is more shifted to the back than in *D. etruscus*. The nuchal crest is far higher, but the occiput is inclined forward as in *D. etruscus*. The rear hornbase relief is hardly distinguishable, like in *D. etruscus*, while the front hornbase rugosity is rather more prominent. The skull, on the whole, is thicker and more massive. The orbital cavity is placed quite lower, like also the broader zigomatic arch. The latter plunges downward and forward with less marked angle than in *D. etruscus*. The narial notch is deeper and more ample. The ossification of the nasal septa is less advanced. The orbital cavity and narial notch are spaced like in the Tuscan specimens.

The toothrow is slightly longer than in the *D. etruscus* individuals and is apparently more shifted backward: the anterior border of the orbital cavity overlies the M1/M2/ commissure, while the rear border of the deep narial notch levels the P3/-P4/ commissure. The diastema is longer.

Dorsal view

On the whole the skull in this view appears rather more triangular-shaped as compared with the Tuscan specimens. The outline of the nuchal crest is like that of *D. etruscus*; also the temporal ridges are equally spaced. On the contrary the frontals are much broader and the zygomatic arches are far more projected outward. The anterior border of the zygomatic processes of the temporals are straight and obliquely directed forward and outward. The nasals appear more expanded than in *D. etruscus*.

Ventral view

The anterior border of the choanae levels M2/; however the toothrows appear somewhat shifted backward (the diastema is longer) with respect to *D. etruscus*. Thus the choanae result comparatively shortened.

The sphenoidal region is about as constricted as that of *D. etruscus*.

Occipital view

In this view the skull from Daxlanden appears clearly trapezoidal. The zygomatic processes of the temporals are not obliquely inclined upward and forward as in *D. etruscus* but transverse to the sagittal plane of the skull.

Dicerorhinus etruscus was also reported at Perrier-Etouaires and at Villafranca d'Asti. If the attributions were right these would represent the oldest European findings of the species, in stratigraphic sense. However some reasonable doubt persists. As for what concerns Perrier-Etouaires, the first who cited the presence of *D.etruscus* was Bout (1960). Bout pointed out the existance of two different fossiliferous levels, a lower one (Etouaires) and an upper one (Roca Neyra-Pardines), each characterized by distinct faunal associations. Some forms are common to both levels and among these Bout quotes *D. etruscus* however he neglected to indicate the nature of the material on which he based his conviction.

Guérin (1972) cited the unquestionable presence of *D. etruscus* at Perrier-Etouaires on the basis of "fémurs conservés au musée de Bâle", which would "explique la citation de cette espèce aux Etouaires par Schaubi en 1943". But actually Schaub (1943) stressed the presence of the species at Pardines and Roca Neyra, and not at Etouaires.

Heintz *et al.* (1974) claimed the co-existance of *D. jeanvireti* and *D. etruscus* at Perrier-Etouaires. They emphasized that *D. etruscus* is represented by an atlas, two humeri, a proximal half of a radius, three femurs, an incomplete juvenile tibia and a juvenile calcaneum, but unluckly the Authors failed in reproducing these elements.

More recently Guérin (1980) cited the undubitable presence of *D. etruscus* in quite a number of sites among which Perrier-Etouaires, Villafranca d'Asti and Villaroya. In particular Guérin quoted Perrier-Etouaires among the localities that provided all the *D. etruscus* bony elements listed by Heintz *et al.* (1974) but the tibia, and furtherly added Perrier-Etouaires at the group of localities that supplied fourth metacarpals of *D. etruscus*. Moreover he mentioned Villafranca d'Asti as provenance locality of further *D. etruscus* material in describing the mandible, lower cheek teeth, scapula and humerus, and Villaroya concerning the mandible, upper and lower cheek teeth, scapula, radius, femur and third cuneiform. Guérin also included both *D. etruscus* and *D. jeanvireti* in the biostratigraphic zone MN 16. Guérin surely made an invaluable study of these rhinos; yet he did not report any specific measure nor any kind of reproduction of these bones assigned to *D. etruscus* that could ascertain its real presence at Perrier-Etouaires, Villafranca d'Asti and Villaroya. Unluckly, Guérin also failed in listing the inventory numbers of these specimens.

All the papers mentioned so far, in conclusion, just quote the occurrence of *D. etruscus*, but do not report any more precise data.

Furtherly concerning Villafranca d'Asti, Azzaroli (1963a) emendated Sacco's (1895) *Rhinoceros etruscus* var. *astensis*, assigned to the rhino material from Dusino, into *Rhinoceros megarhinus*. Also

Hürzeler (1967), listing the fossil species that characterize this local fauna, cited the occurrence of *Rhinocerus etruscus* var. *astensis*. The form from Dusino was later called *D. jeanvireti* by Guérin (1972). No other rhino material from Villafranca d'Asti, but that mentioned by Guérin (1980), was elsewere assigned to *D. etruscus*.

Reasoning from all this, the occurrence of *D. etruscus* at a time older than that of the sites St. Vallier-Puebla de Valverde may even be possible, but still deserves careful verification.

* * *

Dicerorhinus jeanvireti is a well defined and rather easily distinguishable form. Guérin (1972, 1978, 1980) fully described it and also provided exhaustive comparisons with other Dicerorhines. Therefore reference should rightfully be made to such studies, concerning this species.

Our attention, instead, will focus on some of the other specimens just seen, namely the ones from Mosbach, Süssenborn, Voigstedt and Tiraspol. They all come from stratigraphic levels more recent than those of Olivola, Upper Valdarno (second lacustrine episode) and Mugello. We pointed out that some, if not all of them, might be more or less closely related to the *D. etruscus* stock and may therefore be supposed to be progressive descendants of this species. We have also seen that these specimens share some of the features that distinguish them from *D. etruscus*. Such features are therefore very important for reconstructing the history of this difficult group of Dicerorhines and should thus be confidently selected and followed in studying the more derived European rhinos of the Middle-Late Pleistocene.

We might enumerate these diagnostic features as follows:

1) the point that marks the change of slope along the dorsal profile shifts backward and the parietal profile results necessarily steeper;
2) the zygomatic arch plunges downward and forward directly in front of the glenoid fossa, without the proximal horizontal portion that characterizes the zygomatic arch of *D. etruscus*;
3) the orbital cavity and zygomatic arch shift to a lower position on the lateral faces of the skull. The orbital cavity also shifts a little backward;
4) the cheek toothrow shifts a little backward. It does not lengthen at the same rate of the rest of the skull, or does not lengthen at all with respect to *D. etruscus*, so that it results proportionally quite reduced;
5) the narial notch gets deep and very broad. Its rear border may overlie indifferently the P3/-P4/ commissure, P4/, the P4/-M1/ commissure or even M1/ itself;
6) the zygomatic arches tend to diverge a little less;
7) the nasals get tremendously expanded ("arrowhead-shape");
8) the occiput gets trapezoidal.

As for what concerns the postcranial skeleton, qualitative differences from *D. etruscus* are not so clear as in skulls. I believe that only a quantitative method, based on the definition of sharply delimited size intervals and on special attention to the exact proportions of the single bones, may warrant enough confidence in assigning a postcranial element to *D. etruscus* or to some other derivative form of this species.

Both size intervals and proportions of the postcranial bones of the Tuscan *D. etruscus* may be drawn from the data reported on the tables of the present paper.

Guérin (1980) provided several ratios of the lengths of limb segments of quite a number of Dicerorhines. It is a pity that he did not specify whether the measures compared through these ratios are physiologic lengths or not. Anyhow we may usefully compare the ratios relative to the limb segments that Guérin assigned to *D. etruscus brachycephalus* with those obtained from the Tuscan specimens (the specimens from Olivola have been distinguished from the ones from the Upper Valdarno, since they come from a single stratigraphic horizon, while those from the Upper Valdarno do not).

Table 51 displays these ratios, along with those relative to the form from Voigtstedt.

It is apparent that *D. etruscus* has proportionally longer stilopodials and shorter zeugopodials than the other two forms; the tibia seems particularly reduced. Its third metacarpals are proportionally longer than those of *D. etruscus brachycephalus* and shorter than those of the form from Voigtstedt. Also its third metatarsals are proportionally longer than those of *D. etruscus brachycephalus* and about as long as those of the form from Voigtstedt.

* * *

The strengthening of the nasal area in *D. etruscus* that is, more specifically, the partial ossification of the nasal septa, was probably required by the particular structure of the nasals that are not bulging as in the extant *Diceros bicornis* and *Ceratotherium simum*, but rather thin and apparently more delicate.

Nevertheless, despite the same general pattern of the nasals, no ossification of the nasal septa occurred in an older European rapresentative of the genus, *D. megarhinus*.

The reason for the ossification of the nasal septa may then be linked with the use of horns.

The nasal rugosity could provide helpful information in this regard. As a matter of fact, according to Loose (1975, pag. 26) "...a large rugosity is not necessarily an indication of large horns, rather of frequent use". Unhappily, however, *D. megarhinus* and *D. etruscus* do not show significant differences in the extension of their horn rugosities.

In nature horns usually have a threefold utilization: sexual display, inter- and intraspecific combat and feeding. In rhinos I believe unlikely the first of such functions. As a matter of fact we can observe that all the animals that base the success of their court on showy and colourful liveries or on the possess of attributes such as horns of particular dimension and architecture have well developed sight and therefore wide open orbital cavities. This sure is not the case of rhinos, that, on the contrary, have rather reduced orbits.

A classical, most familiar use of horns in rhinos is combat. *D. etruscus* was a small-sized, lightly built rhino; it gives the impression, on the whole, of a rather agile animal, capable of rather fast charges. If this were the case, the impact supported by the horns, and therefore by the nasals, during combat might have been violent. Consequently, the nasal septa required to be strengthened. It is also possible that *D. etruscus* were an aggressive, nervous animal, used to often attack. On the contrary, *D. megarhinus* was larger-sized, heavier and indeed not able to run as fast. Perhaps the ecologic frame in which *D. megarhinus* lived did not even require fast run, nor predation pressure was so high to force it to frequent defence or attack. As a matter of fact forests were the dominating floras at that time; furthermore the sites in which *D. megarhinus* was found did not provide carnivors that could particularly worry it; even court combats might have been rather sporadic.

It is known that *D. megarhinus* was replaced, in time, by *D. jeanvireti*, a more agile rhino that dwelt a deteriorated, more discontinuous wood environment. It is curious to notice that the progressive ossification of the nasal septa in these early European Dicerorhines kept pace with the decrement of forest cover and the consequent expansion of grasslands, which in turn was correlated with the diffusion of threatening carnivors, even for a rhino, such as *Pachycrocuta* and *Homotherium*. In this context *D. jeanvireti* certainly resulted more fitly equipped than *D. megarhinus*.

The occasions for using horns as defence weapons probably increased when *D. etruscus* made its appearance on the European scene. As a matter of fact it lived in a more open, savannah-like environment than *D. jeanvireti*, populated by a greater amount and variety of predators. *D. etruscus* was not a runner, as we will see from the analysis of the mechanics of its postcranial skeleton, later on; however it was light enough and its limbs were structured so to infer that it might have been able to fling into short, but swift charges.

We said that a third possible utilization of horns is connected with feeding. In order to realize whether this might have been the main use of horns in *D. etruscus* or not, we must first of all find out how the animal bore its head and its neck. Cranial angles might provide some information in this regard.

Zeuner (1934), in his valuable study of fossil and extant rhinos, emphasized the importance of certain cranial angles for species discrimination within this complex family of Perissodactyls.

Recently Loose (1975, pag. 34) observed that one of these angles, y, is also an "... important factor in distinguishing grazers and browsers". Grazers are characterized by having drooping heads, while browsers bear their heads more erected. Loose (pag. 29) pointed out that in a typical browser, *Diceros bicornis*, angle y is smaller (median 89°), while in a typical grazer, *Ceratotherium simum*, it is much wider (median 109°), thus concluding that *Dicerorhinus hemitoechus* (angle y 119°) "is the only exclusively grazing species among Pleistocene Dicerorhines" and that what he called *D. etruscus* (angle y 88°) was a browsing species. These considerations are indeed consistent with the dentition and with the ecologic preferences of these forms. Nevertheless I do not believe that there is a so strict relation between angle y and browsing/grazing. Concerning *Coelodonta antiquitatis*, Loose himself (pag. 24) observed the co-existance of browsing and grazing characters, such as a low angle y and an uplifted nuchal crest. Likely the lectotype of *D. etruscus*, IGF 756, shows a combination of apparently contrasting features, such as a rather wide angle y (105°, which actually falls within the range of values of *C. simum*) along with a typical brachyodont dentition and a relatively poorly developed nuchal crest. Moreover of the specimens studied by Loose (1975) only the one from Senèze, MNB Se 561, is a true *D. etruscus*, as I already stated elsewhere, and it is not by chance that even this fossil shows the same combination of apparently contrasting characters (angle y: 104°, low crowned teeth, poorly developed nuchal crest) as IGF 756. The other skulls that Loose (1975) assigned to *D. etruscus*, the ones from Mosbach and Mauer, are of heavier and more robust animals. In my opinion they show much closer affinities with the chinese *D. yunchuchenensis* rather than with typical *D. etruscus* representatives. It is also worth to notice that all the specimens from Mosbach and Mauer have relatively low values of angle y.

Another character that distinguishes the Tuscan specimens from those studied by Loose is the shape of the foramen magnum. Lose noted that a smaller angle y corresponds to a triangular-shaped foramen magnum which derives from a higher opisthion. This is the case of the specimens from Mosbach and Mauer, but not of those from Tuscany, in which a wider angle y corresponds to a lower opisthion, and therefore to a roundish foramen magnum (only IGF 12728, from the Mugello Valley, has a triangular foramen magnum).

From all this we can infer that angle y strictly depends on the angle at which the head joins the neck at rest and on the particular architecture of the occipital-cervical region, and has very remote relation with the feeding habits of the animal. In a word, we cannot immediately derive any indication on browsing/grazing from the sole values of angle y. In the case of *D. etruscus* the rather high values for y just indicate that its head joined its neck, at rest, practically at the same angle as in *C. simum*, that is, at a wider angle than in *D. bicornis*.

As for what concerns the arrangement of the neck of *D. etruscus*, the front hornbase rugosity might be of some aid. It is spread over the very front tip of the nasals. The anterior portion of the nasals of *D. etruscus* bends a little bit downward, as we have seen. This might suggest that the front horn were rather inclined forward, so to be used to "sweep" the ground as *Ceratotherium simum* does today (Owen-Smith, 1975). Such a utilization, however, implies the head and the neck to be held markedly bent downward, exactly as in the modern white rhino. This does not seem the case of *D. etruscus*. Its high positioned orbital cavities and the structure and orientation of its occipital area, of its occipital condyles and of the articular surfaces of its atlas, axis and of other cervical vertebrae (we can have an idea of these latter from the specimen from Capitone, a Tuscan-like *D. etruscus* found in Umbria and exposed at the Museum of Geology and Paleontology of Rome, that has a complete cervical column) suggest that *D. etruscus* probably kept its head rather erected, favoured in this also by the relatively light weight of the skull. This surely is a suitable arrangement, since it warrants a better control on locomotion (especially in case of swift displacements, as charges, for example). Also the moderately back-projected and poorly uplifted nuchal crest seems consistent with the supposition of a modest drooping of the head in *D. etruscus*. As a matter of fact we can observe that more the neck plunges downward and more the nuchal crest is uplifted. This is immediately exemplified by comparing, in succession, the skulls of *Rhinoceros unicornis*, *Diceros bicornis* and *Ceratotherium simum*. These rhinos, arranged in the order in which they are listed, bear their necks increasingly inclined downward. Also *Coelodonta antiquitatis*, the woolly rhino, carried its head extremely low, as seems testified by several reconstructions of the animal provided by Fortelius (1983). And in agreement with what observed above, its nuchal crest appears very high and strongly projected backward. As far as the nuchal crest is concerned, *D. etruscus* places between *R. unicornis* and *D. bicornis* in the aforementioned succession of skulls and therefore we are allowed to believe that it bore its neck less inclined downward than the black rhino.

A scarcely uplifted nuchal crest contrasts with the idea of a mainly aggressive utilization of the horns. When present day rhinos charge, they lower the head just before the impact and then pull it up to gore the enemy. This requires strong neck muscles and consenquently a sturdy nuchal crest that forms the power arm of the head whose fulcrum is represented by the occipital condyles. One of the most aggressive rhinos today is *D. bicornis* and it is indeed provided with a well developed nuchal crest. Therefore the development of the nuchal crest might not only be related to the head and neck arrangement, but also partly to the use of the horns for combat. The nuchal crest and the occiput of *D. etruscus* appear rather more extendend laterally than vertically and the muscular tubercle of the basioccipital is prominent. This could suggest that some of the muscles that produced lateral and rotational movements of the head (the splenius, brachiocephalicus, rectus capitis dorsalis major, rectus capitis ventralis, longissimus capitis) were perhaps more developed and even more powerful than those in charge of lifting it (semispinalis capitis, semispinalis cervicis, obliqus capitis minor). The architecture of the articular surfaces of the cervical vertebrae (e.g. the axis) could possibly support such hypothesis.

The logical conclusion of all this reasoning is that the main use of horns in *D. etruscus* were possibly linked with feeding. Probably tendem-horns were suitable branch-breaking tools; branches could be infixed between the two horns and the snapped by shaking and revolving the head.

* * *

The transversely elongated mandibular condyle, the rather poorly developed coronoid process, the stocky vertical ramus with wide masseterine and pterygoid fossae and the thickened mandibular angle indicate that the masseter and pterygoid muscles were rather well developed. Therefore lateral jaw movements certainly played an important role in mastication in the Tuscan *D. etruscus*. However because of the moderately stretched and scarcely uplifted nuchal crest, the temporal fossae result rather reclined and so were the temporal muscles as well. Such an orientation increases the power arm of the temporal forces. Since the temporal muscles are in charge of shutting the jaws communicating vertical motion to the mandible, it follows that also the vertical component of jaw movement might have had some importance in the mastication of the Tuscan *D. etruscus*.

Fortelius (1979, 1982) studied dental features and masticatory functions of rhinos in great detail. He was able to recognize the two masticatory phases identified by Mills (1967) in herbivores, furtherly noting that in rhinos dental shearing prevails during phase I, while crushing/grinding dominatees during phase II. He also noted that the two phases are about equally developed in brachyodont forms, whereas hypsodont rhinos have phase II quite extended. *D. etruscus* was a brachyodont animal. The relative importance of the vertical component of jaw movement and the comparatively prolonged masticatory phase I suggest that dental shearing must have had quite a weight. The consistency of such a conclusion ought to be verified by referring to the reconstructions of the environment of life of these animals made in these last years. Excellent ecological considerations can be found, for example, in Loose (1975), Guérin (1980) and Fortelius (1982). *D. etruscus* is usually indicated as an open deciduous forest to woody savannah dweller. It probably fed on leaves, branches, bark and other coriaceous plant elements as well as on grass, graminae etc. Branches, bark and other such vegetal fibers have relatively low silica content; they are thus not very abrasive, yet are tough enough to require efficient and thorough shearing.

More specific data on rhino teeth, their functional and microstructural aspects, the information they provide on the dietary habits and therefore on the environment of life of these animals can be found in Fortelius (1979, 1981, 1982, 1984), that represent a valuable reference for those who deal with such a topic.

* * *

The shape and arrangement of the articular surfaces of the atlas and axis of the Tuscan *D. etruscus* apparently allowed limited vertical movements of the head, unless all the rest of the neck were also involved, while lateral horizontal movements and rotations along the axis were perhaps more ample. The articular cavities for the occipital condyles, in the atlas, are very deep and their borders quite protruding: thus the degree of vertical rotation results quite reduced. On the contrary, in the axis, the cranial articular surfaces that join one another anteriorly through the ventral articular surface of the dens axis possibly enabled wide swirling of the head. All this seems consistent with the already hypothesized utilization of horns for feeding rather than for combat and also with the need, for a wide space dweller and fast charging animal, of good control on locomotion.

* * *

According to Gregory (1912) the closer the muscular resultant applied to a limb bone is to an articulation regarded as a pivot, that is to say, the shorter the moment of a muscular resultant about a joint and the smaller the angle of insertion of such muscles to the bone, the faster the distal end of the limb bone will move. The scapula of the Tuscan *D. etruscus* is rather long and slender and it was probably held just slightly reclined backward in the living animal. The muscle arrangement that follows from such a disposition seems consistent with the opinion that the animal was capable of rather swift displacements, for a rhino. However the forward movement of the fore limb might have been somehow not so rapid as its withdrawal. Once the hand is raised from the ground, the fore limb is slung forward by the brachiocephalic muscles and the thoracic portion of the serratus ventralis. We already supposed that the animal held its neck relatively high, but anyhow somewhat lowered with respect to the horizontal. This, combined with the just mentioned arrangement of the scapula, suggests that the two groups of muscles must have inserted at rather wide angles to the scapula.

On the contrary, muscles such as the teres, the deltoid and others that run from the scapula to the humerus result provided with very reduced moments about the articulation between the two bones. They also attach to the humerus in rather proximal positions (e.g. the deltoid and teres major tuberosities seem quite shifted upward along the diaphysis). Therefore we are allowed to presume that the humerus could be rotated rather swiftly. Referring to the mounted *D. etruscus* skeleton from Capitone we notice that the animal was characterized by a comparatively short and solid trunk, by well developed spinal processes in the withers region, long limbs and a rather long neck. Owing to the compact brief trunk we might infer the animal being equipped with rather fore-constrained latissimi dorsi muscles. With such an arrangement these muscles would insert on the humeri at quite low angles; hence provided they are among the main muscles in charge of pulling backward the humeri, together with the deep pectorals, the withdrawal of the fore limb might have been rather swift, though not too powerful. This could also be compatible with the arrangement of the cervical portion of the serratus ventralis, the muscle that pulls forward the proximal end of scapula further contributing to the withdrawal of the fore limb. As a matter of fact the moderate flexion of the neck and slight inclination of the scapula determine a quite small-angled insertion of this muscle on the scapula, so to ensure a rather rapid fore-tug of the bone.

Even the biceps and the brachial muscles attach to the radius very close to its articulation with the humerus. Their moments about the articulation are small and their insertion angles are reduced as well. Hence, the radius could probably swing ahead rather fast; no particular power was required for this. The triceps, instead, seems to have been a strong muscle, as we can infer from the well developed, protruding tricipital line on the humerus and the thick and rather long olecranon of the ulna. A powerful triceps may not only be correlated with locomotion, but even with horn utilization.

* * *

The muscles that are in charge of moving the hind limb can grossly be distinguished into iliac muscles and ischio-pubic muscles, in accordance with the area of the pelvis they attach to. The first are represented by the glutaei, the second by the adductor magnum, the semimembranous, the femoral biceps, the semitendinous and the gracilis. All these muscles yield a fast or slow gait, according to the length of the power arms of the bone levers they apply to and to their moments.

The pelvis as a whole in the Tuscan *D. etruscus* was inclined at about intermediate angles with respect to both typical cursorial forms, that have a rather subhorizontally arranged pelvis, and graviportal forms, that, instead, are equipped with a subvertical pelvis. This position of the pelvis reduces the insertion angle of the glutaeus medius on the trocanter major, accordingly with what observed by Gregory (1912), as well as the moment of the muscle about the acetabulum, that is furtherly reduced by the shortness of the trocanter major itself. Other important features are the structure and the length of the ilium; the bone, in the Tuscan *D. etruscus*, appears broadly concave, laterally expanded and about twice as long as the ischium. The glutaei probably were stretched and therefore limitedly contractible. A so structured ilium, coupled with the elsewhere described arrangement and development of the trocanter tertius, suggest that also the glutaeus superficialis must have been rather stretched and most probably had a reduced moment about the acetabulum. Such muscle arrangement produces swift movements with loss of power.

According to Gregory (1912) the ratios between the length of the third metatarsal and the femur and that between the length of the tibia and the femur are quite diagnostic in graviportal-cursorial discrimination, much more that the analogous ratios between fore limb components. The two ratios, in *D. etruscus*, are, respectively, .40 and .68 (in terms of physiologic lengths). The first of these values places this rhino among Gregory's subcorsial-mediportal forms, the second among graviportal forms. *D. etruscus* was indeed equipped with comparatively long metapodials for a rhino.

On the basis of all these data we are therefore allowed to consider the Tuscan *D. etruscus* certainly not a runner, but still an animal capable of swift, though not prolonged charges.

The capacity to reach high speed of locomotion seems also indicated by the peculiar co-existance of a proportionally long neck, a short, compact trunk and rather long limbs. The barycenter of a quadrupedal animal, in normal station, is located about at the center of the vertebral column or at its point of maximum flection. The head and the neck have the critical function of shifting the barycenter forward or backward, acting as a lever balancer. For this reason cursorial quadrupeds generally have a long neck in order to move their center of weight forward and thus increase their speed; we already supposed that the Tuscan *D. etruscus* probably bore its head somewhat lowered with respect to the horizontal. Moreover fast moving animals ordinarily bear a short, rather solid trunk, that better transmits the impulsion of the rear limb than a long trunk.

* * *

Concerning the environment of life of *D. etruscus* Loose (1975), Fortelius (1979, 1982) and Guérin (1980) on the basis of either its paleogeographical distribution, or of the faunal associations it is found with or even of its dental characteristics, ascribe the animal to a savannah-open woodland habitat, as we said. The hand and the foot bones are arranged so as to suggest that the fingers were held rather spread apart and this is how they actually appear in Azzaroli's (1963a) reconstruction. Such a disposition is usually encountered, though with some exceptions, in animals that roam on soft grounds, as it ensures a sufficiently wide open support which avoids sinking. Since the Tuscan *D. etruscus* was not comparatively heavy and yet bore rather divaricated fingers for a rhino, we can likely assign it to a quite humid, woody environment, though interrupted by open grasslands, rather than to a typical, somewhat drier savannah landscape, characterized by only scattered trees. Such a reasoning could possibly find correspondence with the already supposed main use of horns, connected with branch-fracturing and thus with feeding, as well as with the low-crowned, almost cementum-free teeth.

* * *

A difficult matter to deal with, concerning rhinos, is sexual dimorphism. Thenius (1955), Vialli (1956), Shack (1958), Azzaroli (1963a) and Cantaluppi (1969) emphasized the sexual importance of some features (rate of ossification of the nasal septa, breadth of the nasals and of the zygomatic arches, etc.). Loose (1975) firmly disagreed, pointing out that the characters used for distinguishing skulls of males from skulls of females, among both fossil and extant rhinos, are not selected over statistical samples of individuals and prove to be misleading if used in large modern populations. Loose added that in his personal view "...sexing fossil rhino skulls is a waste of time".

I rather agree with Loose. In my study of the Tuscan *D. etruscus* I have never been concerned with a statistical amount of fossil remains, whatever kind of bone I happened to deal with, and I could not either evidence any reliable bimodal distribution of the measurements I took. Therefore I find that, at least in the case of *D. etruscus* from Tuscany, sexing actually seems still matter of personal opinion, until a far richer record may ever be available.

CONCLUSIONS

The Tuscan *Dicerorhinus etruscus* was a light weight, small, two-horned browsing rhino that preferably lived in a rather humid, woody environment. Its slightly down-tilted head was probably held up rather high on the ground by a powerful, moderately inclined neck. The skull is structured so as to suggest that lateral shaking of the head might have been more usual to the animal than vertical "nodding" movements. This could possibly be connected with the principal use of horns, which would thus result being mainly branch-breaking devices. Two more coupled features, namely low-crowned dentition and spread apart fingers, make us rather confident of the habitat preferences of *D. etruscus*, which seems to have been mostly adapted to a rather soft floored environment quite rich in trees and tender plants.

Most of the forms hitherto ascribed to *Dicerorhinus etruscus* are heavy, rather robust rhinos (apparently quite similar to the Chinese *D. yunchuchenensis* Chow Ben-Shun), perhaps somehow related to the Tuscan *D. etruscus* stock, but certainly distinct from the latter, that represents the type population of the species. For this reason it would be more convenient to separate such forms as representatives of at least a new subspecies, waiting for more accurate study to be performed.

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PLATE 1

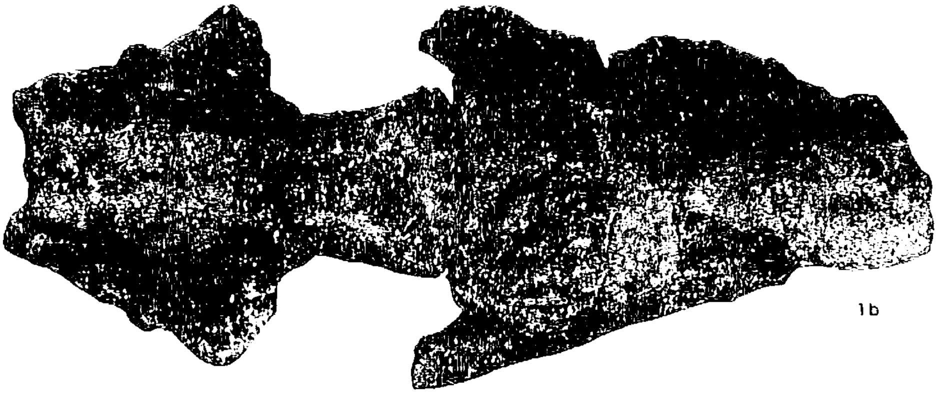
Dicerorhinus etruscus (Falconer) Upper Valdarno Museum of Geology and Paleontology of Florence
Fig. 1, skull (IGF 756, Lectotype of the species), a) lateral view, b) dorsal view, c) ventral view, d) occipital view.

PLATE 1

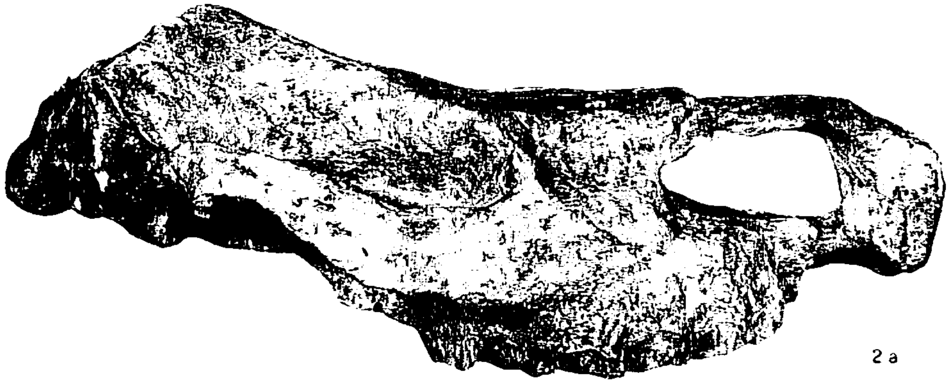
PLATE 2

Dicerorhinus etruscus (Falconer). Upper Valdarno - Museum of Geology and Paleontology of Florence.
Fig. 1, skull (IGF 746), a: lateral view, b: dorsal view.
Fig. 2, skull (IGF 889), a: lateral view, b: dorsal view.

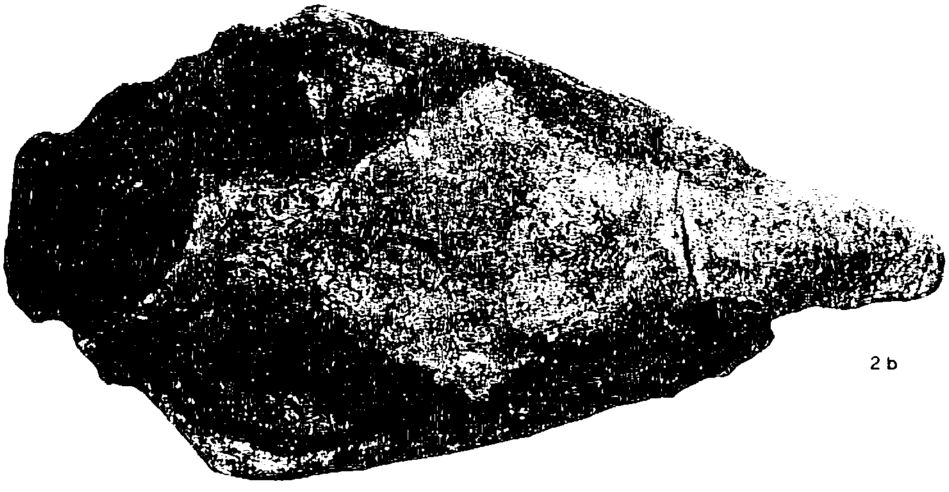
1a



1b



2a



2b

PLATE 2

PLATE 3

Dicerorhinus etruscus (Falconer) - Mugello - Museum of Geology and Paleontology of Florence.
Fig. 1, skull (IGF 12728), a: lateral view; b: dorsal view.

Dicerorhinus etruscus (Falconer) - Olivola - Museum of Geology and Paleontology of Florence.
Fig. 2, skull (IGF 12488), lateral view

1a

1b

2

PLATE 3

PLATE 4

Dicerorhinus etruscus (Falconer) Olivola Museum of Geology and Paleontology of Florence.
Fig. 1. skull (IGF 1427 V), lateral view.

Dicerorhinus etruscus (Falconer) Upper Valdarno Paleontological Museum of Montevarchi.
Fig. 2. skull (n. 2 glass case n. 8), lateral view.

Dicerorhinus etruscus (Falconer) Upper Valdarno Museum of Geology and Paleontology of Florence.
Fig. 3. atlas (IGF 727), a: dorsal view, b: ventral view, c: cranial view, d: caudal view.
Fig. 4 right scapula (IGF 718), a: lateral view, b: ventral view.

PLATE 4

PLATE 5

Dicerorhinus etruscus (Falconer) - Upper Valdarno - Museum of Geology and Paleontology of Florence.

Fig. 1, left humerus (IGF 14840). a: anterior view, b: rear view, c: medial view, d: lateral view, e: dorsal view, f: ventral view.

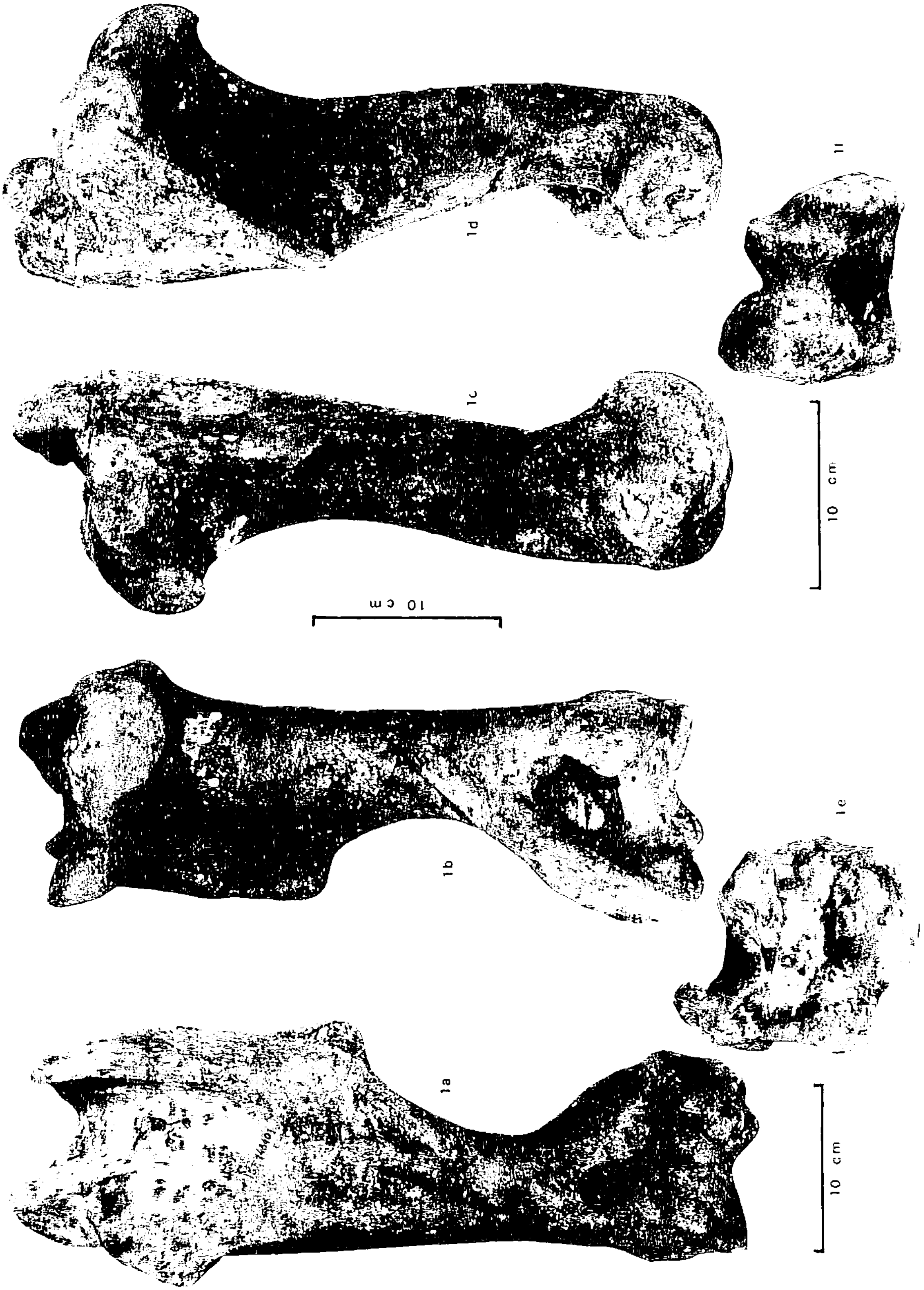


PLATE 5

PLATE 6

Dicerorhinus etruscus (Falconer) - Upper Valdarno - Museum of Geology and Paleontology of Florence.

Fig. 1. right radius and ulna (IGF 2211 v). a: anterior view. b: rear view. c: medial view. d: lateral view. e: dorsal view. f: ventral view. g: dorsal view of the radius.

PLATE 6

PLATE 7

Dicerorhinus etruscus (Falconer) - Upper Valdarno - Museum of Geology and Paleontology of Florence.
Fig. 1, left femur (IGF 722), a: anterior view, b: rear view, c: medial view, d: lateral view, e:dorsal view, f: ventral view.

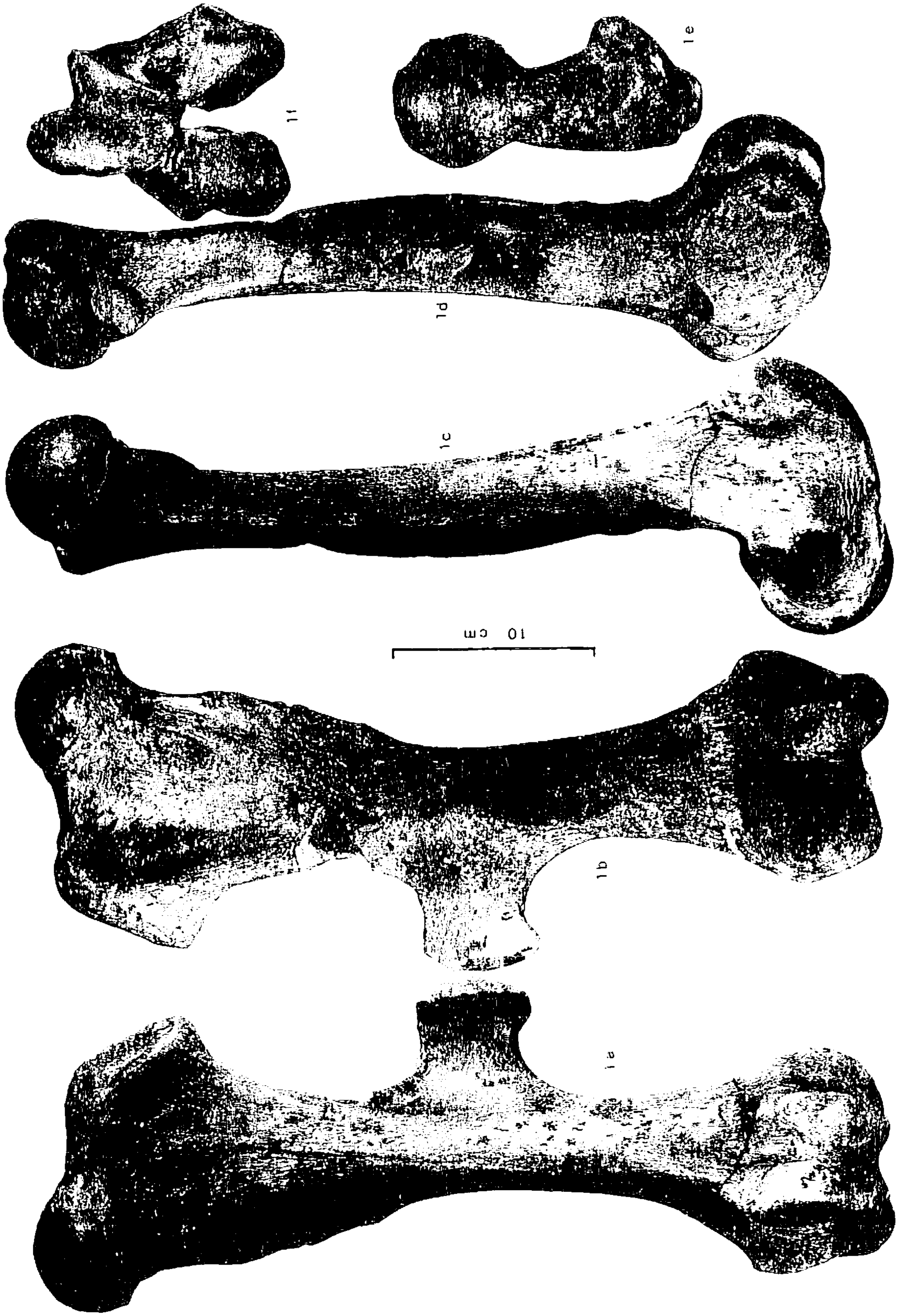


PLATE 7

PLATE 8

Dicerorhinus etruscus (Falconer) - Upper Valdarno - Museum of Geology and Paleontology of Florence.

Fig. 1, left tibia (IGF 722), a: anterior view, b: rear view, c: medial view, d: lateral view, e: dorsal view, f: ventral view.

Fig. 2, right astragalus (IGF 2243 v), a: dorsal view, b: plantar view, c: medial view, d: distal view.

Fig. 3, left calcaneum (IGF 719), a: dorsal view, b: plantar view, c: proximal view, d: distal view.

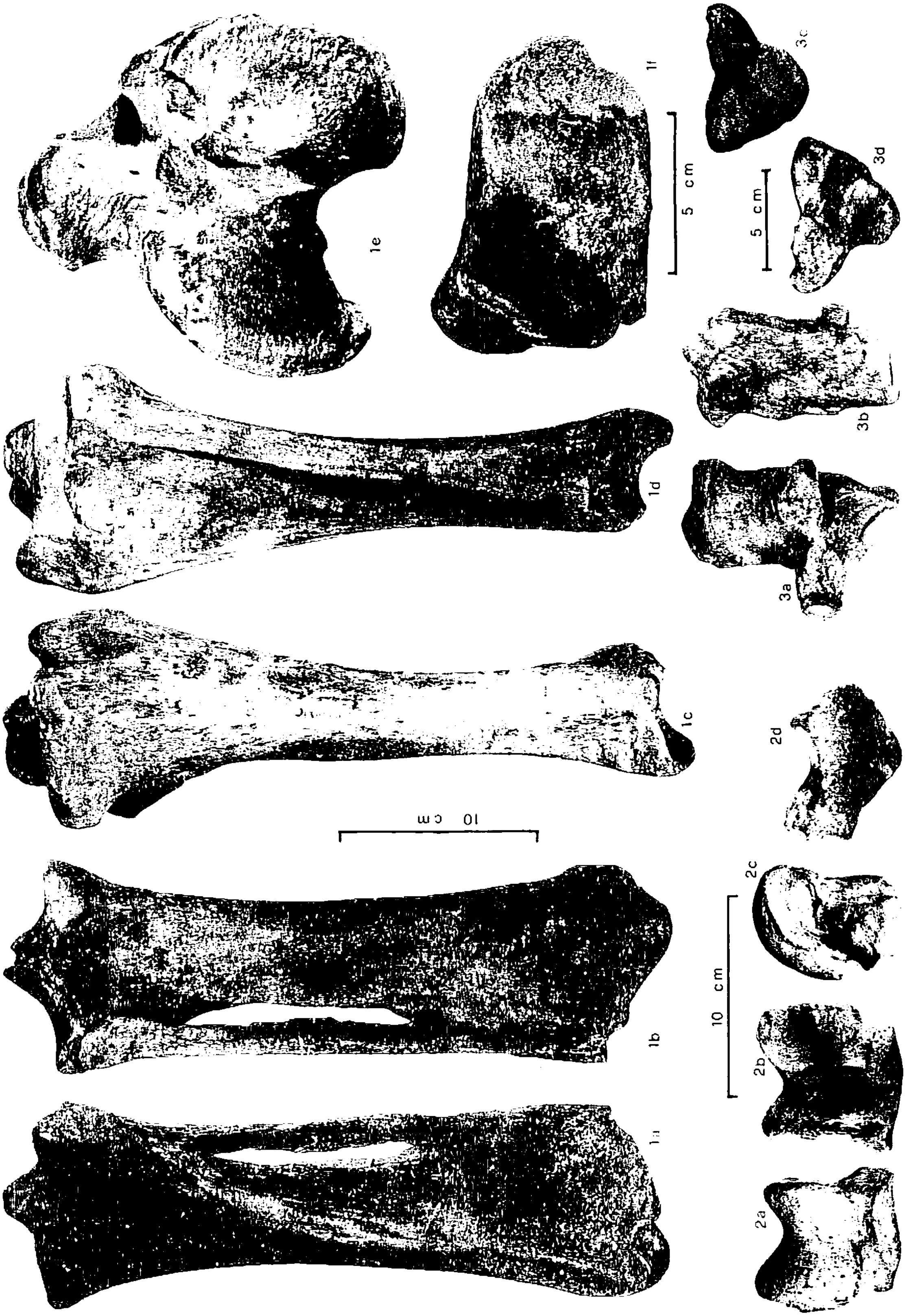


PLATE 8

PLATE 9

Dicerorhinus etruscus (Falconer) - Upper Valarno - Museum of Geology and Paleontology of Florence.

Fig. 1, right second metacarpal (IGF 1355 v), a: anterior view, b: dorsal view.
Fig. 2, right third metacarpal (IGF 1355 v), a: anterior view, b: dorsal view.
Fig. 3, right fourth metacarpal (IGF 716), a: anterior view, b: dorsal view.
Fig. 4, right second metatarsal (IGF 716), a: anterior view, b: dorsal view.
Fig. 5, right third metatarsal (IGF 716), a: anterior view, b: dorsal view.
Fig. 6, right fourth metatarsal (IGF 716), a: anterior view, b: dorsal view.

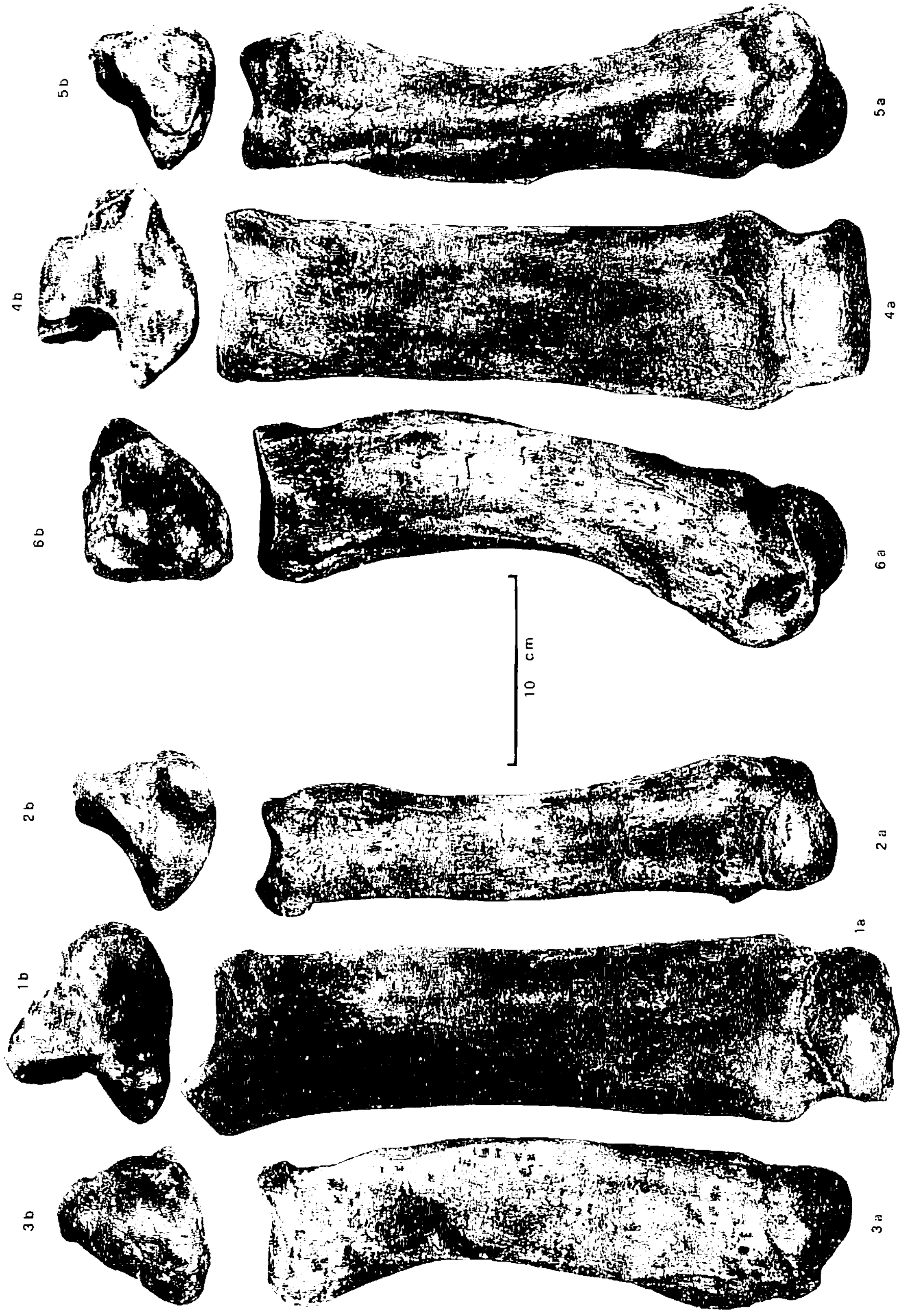


PLATE 9

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