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BRECCIA BLOCK A

A plan of the semi-prepared block was made, with the numbered bones indicated (figs. 11, 12). The specimens will be described in groups according to their anatomical positions in the animal. Fifty eight fragments were extracted, of these forty eight will be described. The remaining ten were too incomplete for identification.

The ribs

Fourteen ribs were preserved. Most of these were complete and enabled an identification into right and left ribs and their number in the series.

The first pair of ribs (fig. 13 a and b) are short and stout, with a marked forward and inward curvature. The capitulum and tuberculum are large and distinct, separated by a short cylindrical neck. The capitulum, which articulated with a facet on the centrum of the first thoracic vertebra, is prominent and distinctly rounded. The tuberculum has a convex anterior surface and a concave posterior surface.

The dorsal portion of the shaft is slightly oval in cross section, flattened transversely. The central portion is flattened on the inner surface, the outer surface being rounded and tending to form a slight vertical crest. Ventrally the shaft flattens in the longitudinal plane. There is a posterior vertical crest running ventrally from the tuberculum for about 1,5 cms. This is a buttress for the origin of the external intercostal muscle which pulls the posterior adjacent rib forwards and upwards.

The second pair of ribs (fig. 13c) are longer and flatter and less curved than the first pair. The ventral portion of the left one, No. 48, is missing and it is not illustrated. The capitulum and tuberculum are distinct, although slightly smaller than those of the
first pair. The tuberculum has a rounded dorsal facet which projects posteriorly as a small ridge. The dorsal portion of the shaft is extremely flattened in the transverse plane, this flattening gradually twisting round into the longitudinal plane ventrally. The central portion of the shaft is again slightly triangular in section. The vertical crest beneath the tuberculum is more marked than in the first rib, and on the anterior surface, about two centimetres beneath the capitulum is a minute longitudinal crest which marks the origin for the internal intercostal muscle.

The succeeding pairs of ribs (figs. 13d, e, 14 and 15) are similar to the second pair, but gradually increasing in length. The neck becomes progressively flatter longitudinally; the tuberculum becomes less prominent so that the two heads appear to merge into one; the capitulum becomes progressively larger with an irregularly rounded dorsal surface. As the ribs increase in length the central portions become more rounded in section. From the third to the sixth, the ventral portions are extremely flat longitudinally, and expanded distally into a spatulate shape. The seventh and eighth ribs have a more rounded ventral section.

No. 1 is probably the left thirteenth rib (fig. 15e). It is broken ventrally, but from its slenderness could not have been much longer than the preserved part. It is short and narrow. The dorsal portion is rounded in section and the ventral portion slightly flattened. There is one small rounded head, the fused capitulum and tuberculum, and there are no muscle origin areas.

Nos. 15 and 15a (which was underneath No. 15 in the breccia) are rib fragments. They are both smooth and flat and would be portions of the distal part of the rib.

No. 43 (fig. 15b) is part of the shaft just below the angle of
a left rib. Since it was associated with the eighth left rib, and since it has the same diameter, it is possibly a portion of the ninth left rib.

The Sternum

Nos. 12, 24, 26, 30, 32 and 40 are the six elements of the mesosternum (fig. 16). They were found in the correct linear order although slightly displaced (see fig. 11). The sternbrae are all uniform in shape. They are oblong, with cylindrical central portions, the anterior and posterior ends flaring out into a roughly square cross section. The anterior ends are slightly wider than the posterior ends.

The ends are all covered firmly by matrix which has replaced the cartilage discs lying between them. Where it has been possible to remove the matrix, as in No. 14, there is seen a peripheral rim of smooth bone surrounding a central area of spongy bone, where the cartilage joined the surface directly. This same feature is seen on the ends of some of the ribs (which were also covered in matrix) where the sternal portion joined to them.

The vertebrae

Two cervicals, a thoracic and three sacral vertebrae are preserved.

No. 3 (fig. 17) is the sixth cervical vertebra. It is practically complete except for the neural spine, part of the prezygaphysis and chips from the inferior lamella. These parts were probably lost before fossilization, deduced from the worn appearance of the broken surfaces. The bone has a very corroded appearance.

The neural arch is large and wide, with a slight hexagonal outline. The centrum is opisthocoelous with obliquely truncated
ends. The anterior end of the centrum is semi-circular in circumference and the posterior end circular. On either side of the centrum are well defined vertebral canals. The transverse processes are divided into an upper rod-like horizontal portion, projecting slightly backwards, and a wing-like vertical inferior lamella, projecting obliquely downwards. On the external walls of the neural arch are two deep depressions.

The inferior lamella served as a flange for the scalene muscles whose action pulled the ribs forward and bent the neck. It is large, thickened anteriorly, and is not notched or perforated. Internally there are two oblique ridges which probably served to strengthen the muscle attachments. Part of the serratus ventralis series of muscles also originated here and raised the scapula towards the dorsal column.

On the dorsal surface of the neural arch, just anterior to the post-zygapophyses is a pair of sharp ridges providing attachment area for the rhomboideus and acromio-trapezius muscles, both raising and suspending the scapular. From its wide base, the neural spine was strong and thickened anteriorly.

No. 5 (fig. 18) is the seventh cervical vertebra. The right transverse process, the neural spine and the left portions of the neural arch and centrum are missing. The breakage plane of the latter is oblique and occurred after fossilization, but the neural spine was lost before fossilization. A piece of the left prezygapophysis is also lost.

The vertebra is slightly smaller than the sixth cervical. The shape of the centrum is similar to the previous specimen and there are the same muscle origin areas. On the ventral surface is a median longitudinal ridge with a smaller ridge to the right side of it. The
neural arch is wide and the zygapophyses large and horizontal. The transverse process is a short slightly horizontally flattened rod, the distal end directed upward. There is a broad flange on the anterior border and a smaller sharp flange on the posterior border. There are no vertebrarterial canals or inferior lamella and the broken base of the spine indicates that it was directed vertically.

No. 6 is the left half of a thoracic vertebra (fig. 19a - c). The broken surface is oblique so that most of the anterior surface of the centrum is present while only a portion of the posterior surface is preserved. The spine is absent.

The complete vertebra was approximately the same size as the last cervical. The centrum, although with the same diameter, is slightly shorter and the ends are considerably less oblique. The anterior end is slightly convex and the posterior end rather flat. The neural arch is narrower than those in the cervicals, and the zygaphophyses are smaller and slightly more vertical. The prezygapophyses are at a slightly lower level than the post-zygapophyses, which are also spaced much closer together.

The transverse process is a very short, stout rod and situated far anteriorly. The dorsal surface is convex, the ventral surface concave and the distal end forms a large hemispherical facet for the tuberculum of the rib. On the side of the centrum, just under the transverse process, is a marked depression forming a facet for the capitulum. At the extreme posterior end of the centrum, facing dorso-laterally, is a demi-facet for the capitulum of the following rib. Only the base of the neural spine is present, as a longitudinal ridge extending the length of the neural arch.

From its close proximity in the breccia to the cervical vertebrae, it is suspected that No. 6 is the first thoracic. This is also
indicated by the wide neural canal, widely spaced zygapophyses and slightly oblique centrum ends. The transverse process is also short and wide, with a large facet to accommodate the large tuberculum of the first rib.

No. 22 (fig. 19d, e, f) is possibly a transverse process of one of the lumbar vertebrae. One end is wide and flat and the opposite end is narrow and thick.

Nos. 33 and 34 both comprise the sacrum (fig. 20). There has been a major distortion which occurred before burial and the bone is very broken. Just anterior to the fusion between second and third centra, there has been a break in which the posterior portion has slipped to the left by about two centimetres. In addition, it has been bent to the left by twenty degrees. To the left of the break, the dorsal surface is represented by a mass of bone fragments held together by matrix.

About two centimetres anterior to this break, just in front of the second neural spine, there has been an erosion of the neural arch leaving the second and third vertebrae with their centra exposed. The neural arch connecting the first and second vertebrae has been depressed. The first neural arch has been broken at its base. The zygapophyses between the first, second and third vertebrae are missing, and so are the second and third transverse processes. Only the base of the second left transverse process is preserved, and appears as a small wing.

The neural arch of the first vertebra has a very crushed and corroded appearance, with irregular patches of bone exposed and in some places invaded by matrix. The ventral surface of the whole sacrum is entirely smooth.

The three vertebrae decrease in width from the first to the third. Each centrum is a flattened oval in section, the first with a kidney-
shaped anterior surface. The first neural arch is low and wide, but has been further depressed by fossilization pressure.

The prezygapophyses of the first vertebra are missing, and their broken surfaces appear as a horizontal plane across the dorsal surfaces of the alae. The latter are short, thick and with expanded distal ends forming large vertical kidney-shaped facets for articulation with the ilia. The remaining two vertebrae are much narrower, although the size of their transverse processes is not known. They do not decrease in length unduly.

Ventrally, there is a foramen behind each of the first transverse processes, demarking it from the succeeding one and serving as an entry and exit for nerves and blood vessels. There is sign of a similar foramen between the second and third vertebrae, on the right side.

From the dorsal damage to this bone, and from the well-preserved ventral surface, it appears that it was subject to pre-burial damage from above. Gnawing by haenas seems unlikely as the ventral surface is uncrushed.

The humerus

No. 11 is the proximal portion of the left humerus (fig. 21). It is complete to about half way down the shaft, where it has been broken by blasting of the breccia.

Postero-laterally is the large convex head and, immediately anterior to it, the greater tuberosity is in the form of a stout ridge extending across the anterior surface in an oblique line. On the medial side, separating the greater and lesser tuberosities, is the deep bicipital groove. The lesser tuberosity lies on the medial side of the head separated from the latter ventrally by a wide groove.
Author Collings G E
Name of thesis Some New machaerodonts from Makapansgat limeworks 1973

PUBLISHER:
University of the Witwatersrand, Johannesburg
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