

XIX. *Pelvic Characters of Thylacoleo carnifex.**By Professor OWEN, C.B., F.R.S., &c.*

Received April 13,—Read April 26, 1883.

[PLATE 46.]

SINCE the communication of the 1st February, 1883, "On the Affinities of *Thylacoleo*," I have received, through the favour of the Trustees of the Museum of Natural History, Sydney, and the care of the accomplished keeper, E. P. RAMSAY, Esq., F.L.S., a second consignment of the palæontological results of his exploration of the Breccia Caverns of Wellington Valley, New South Wales.

Besides additional confirmation of the dental, mandibular, antibrachial, ungual, and other osteal characters of *Thylacoleo*, these accessory specimens afford further evidence of the carnivorous modifications of parts of the skeleton. Of these a well-marked one is yielded by the pelvis (Plate 46, fig. 1).

I may premise that this part in *Felis* and *Macropus* shows the following differences :—

In *Macropus major* (Plate 46, fig. 2) the ilium, *i*, extends above, or anterior to, the acetabulum, *a*, into an elongate body of a triedral form: the two outer facets are deeply hollowed transversely, are separated from each other by a sharp well-produced ridge, and each is divided from the flattened and roughened mesial, or sacral, third surface by similar ridge-like productions bounding the respective margins of the outer non-articular surfaces. In *Felis* (Plate 46, fig. 3) the superacetabular body of the ilium, *i*, is a relatively broader plate of bone with the slightly concave outer surface undivided. The ilium, in *Macropus*, bends outward to its free tuberos end and contracts thereto. In *Felis* it slightly expands to the ridge-shaped free border. In *Macropus* the contour of the acetabular margin approaches a triangular figure, the truncate apex being forward or next the ilium; the basal part of the margin is cleft above the canal or groove leading from the ischium, *s*, to the bottom of the articular cavity, *a*. In *Felis* the contour of the acetabulum, *a*, is sub-circular; the iliac border is not produced into an angle. The synovial glandular pit is broader and shallower, and the mesial boundary of the canal leading thereto is not produced; the lateral boundary alone arches over part of that canal.

A marked difference between *Macropus* and *Felis* is the relative length and slenderness of the ischium, *s*, as it recedes from the acetabular region to the terminal

tuberosity, *s'*. In the Marsupial it contributes four-fifths of the outer border of the relatively large obturator vacuity, *o*. In *Felis* the shorter, broader, and thicker body of the ischium, as it descends or retrogrades to the tuberosity, *s'*, contributes but half of the outer border of the relatively smaller obturator foramen, *o*, the anterior third of each border running parallel with the acetabulum.

The portion of pelvis from the Wellington cave (Plate 46, fig. 1) corresponds in size, and includes the parts to which the above-defined characters of the carnivorous and herbivorous Mammals can be respectively compared. The ilium, *i*, is lamellar in form, not a triedral bar. The acetabulum, *a*, has a wide and shallow sub-circular synovial cavity, *p*, the entry to which is not encroached upon by the mesial and distal acetabular border, but is partially overarched thereby posteriorly or laterally.

The tuberosity, fig. 1, *t*, for the origin of the superacetabular tendon of the rectus femoris muscle is rather more prominent than in *Felis*, fig. 3, *t*; in *Macropus*, fig. 2, *t*, it is almost flat, and is indicated by a roughened surface.* The distance of this surface from the acetabulum is the same in the Kangaroo as is that of the process, *t*, in the cave-fossil; in the Lion it is nearer to the acetabular border.

In *Macropus major* a subquadrate process, *i*, with a basal breadth of one inch, extends for seven lines forward from the ilio-pubic commencement of the brim of the pelvis. This process does not relate to the attachment of a marsupial bone, it answers rather to the "anterior inferior spine" of the human ilium, and gives attachment to the main origin of the "rectus femoris;" it may relate, in both, to the action of that muscle in maintaining the erect, bipedal posture.

The "anterior inferior spine" is represented by a narrow rough slightly produced ridge from the same position in the leonine pelvis, and is not more developed in the cave-fossil. In this the facets, fig. 1, *m*, at the fore-end of the ischio-pubic symphysis for the attachment of marsupial bones, are present: but such surface is not upon an outwardly produced epiphysial bone, as in the full-grown *Macropus major*.

But now it may be asked—"Why is the comparison confined to the largest of the existing herbivorous Marsupials?" To which I reply that size seems to relate to the sphere of activity in which Marsupials obtain their vegetable food. Those that seek it in trees, like the arboreal Phalangiers and Koalas, do not exceed a Cat or Rabbit in size, while the grazers attain a bulk which equals that of *Thylacoleo carnifex*, and the vegetarian contemporaries of that extinct species much exceeded in size the Boomer Kangaroo (*Macropus major*). Among the cave remains of the prey of *Thylacoleo* is part of a gnawed pelvis twice the size of that of the Boomer, but closely repeating the Macropodal characters of that part of the skeleton in the existing Kangaroos.†

* In man it is a groove, and gives attachment to the so-called "reflected tendon" of the rectus femoris.

† 'Fossil Mammals of Australia,' 4to., vol. ii., pl. cxxx. (*Palorchestes*).

I have, however, pursued my comparisons of the Thylacolean pelvis with that of smaller Marsupial vegetarians, and also with the pelvis of the existing carnivorous Marsupials, the largest of which is small in comparison with *Thylacoleo*.

In all these existing Marsupials the triedral character of the elongate ilium is retained, but in a much less marked degree than in *Macropus*. The outer dividing angle or ridge is feebly developed, and the facets it divides are not excavated, not in any of them, at least, as in the Kangaroos. The anterior end of the ilium bends outward in the Koala, and, in a greater degree, in the Wombat. The dasyurine pelvis, figs. 4, 5, resembles in the minor indication of such bend that of the cave-fossil; and also shows the relative shortness of the ischium as it extends from the acetabulum, and the characters of that cup. But both *Thylacinus* and *Diabolus* differ from *Thylacoleo* in the minor development of the superacetabular process, *t*, in the size of which the great pouched Carnivore resembles the Felines. Both, however, repeat in the mere roughened indication of the strong antacetabular process, *i*, in the Kangaroos, the character by which the Felines resemble *Thylacoleo*. The triangular facets, *m*, at the fore-end of the ischio-pubic symphysis, for the attachment of the pouch-bones are as in *Thylacoleo*.

Thus it was seen that in the points in which the Fossil differs from the Feline, it adheres to the Marsupial type, especially as shown by the larger still existing pouched Carnivores; as, for example, on the shorter extent of the ischium below the acetabulum and in its tuberos end being continued more squarely mesiad, instead of bending forward to join the pubis, as in *Felis* (fig. 3, *o*).

On the whole the fossil pelvis most resembles the dasyurine modification of this part of the skeleton, but by characters too nearly similar to those in the equipedal Diprotodonts to sanction a reference of *Thylacoleo* to the Polyprotodont group.

One character by which the larger Carnivore differs from the existing Marsupials, and agrees with the placental Carnivores, viz.: the superacetabular tuberosity, *t*, e.g., indicates a disposition of powerful limb-muscles in harmony with their frequent actions in a predatory quadruped engaged in pulling down a larger vegetable-feeder. In the differential modifications of the pelvis of the terrestrial pouched grazers and browsers may be seen relations to muscular developments needed for the transfer of locomotive power, in rapid flight, to one pair of limbs, the hinder ones, in which the larger terminal horn-sheaths of the digits approach the character of hoofs. The smaller fore-paws retain the unguiculate structure, relating, in the female, to the economy of the pouch.

If the foregoing details be deemed tedious, or seem superfluous, in addition to the deductions as to the life-work of the extinct Marsupial founded on its skull, its teeth, its fore-limbs, I must plead the deserved reputation as a Comparative Anatomist of the distinguished Member of the Royal Society, who doubts the carnivory of the

Thylacoleo;* and the testimony which Professor FLOWER cites† in support of his doubts, may also have weight with many readers:—"Mr. GERARD KREFFT, the able Curator of the Australian Museum, Sydney, in the 'Annals and Magazine of Natural History,' vol. xviii., ser. 3, p. 146, 1866, gives his opinion that '*this famous Marsupial Lion was not more carnivorous than the Phalangers of the present time.*'"

The value of this testimony I leave to the judgment of the Fellows of the Royal Society of Sydney, and of the Linnean Society of the same capital of New South Wales.‡

ADDENDUM.

(Added August, 1883.)

[Since the Report by the Referees on the preceding Paper was submitted to the Council of the Royal Society, I have received from the Secretary the following remark made by one of the Referees:—

"I think the value of the Paper would be enhanced if it contained a distinct statement whether the reference of the fossil to *Thylacoleo* is inferred or based on such circumstantial evidence as leaves no room for doubt in respect to its identification."

The following is submitted in compliance with the Secretary's suggestion. The circumstantial evidence consists in the absence of any other fossils, showing a carnivorous type of dentition, agreeing in size with limb-bones of like indication and corresponding size, save jaws and teeth, of a *Thylacoleo*. The arrival, subsequent to the reading of the Paper, of Mr. ED. W. RAMSAY, F.L.S., as Superintendent of the Australian Department of the Fisheries Exhibition, has added, by verbal details and supplementary specimens, direct confirmation of the deductions from his previous transmission of the described fossils. If no other specimens than the limb-bones had been received they would have impressed me with the conviction that a Carnivore exceeding in size the existing Thylacine, in the degree in which the Lion surpasses the Wolf, had co-existed with the Diprotodonts, Nototheriums, and other large phytophagous Marsupials.

* "What was the particular form of food associated with the most singular dentition of *Thylacoleo*, it would be hazardous to do more than conjecture. As the flora of the country in which this strange animal existed has probably undergone as great a change as the fauna, it is not unlikely that the material on which it subsisted has passed away with the creature itself. It may have been some kind of root or bulb; it may have been fruit; it may have been flesh."

† "On the Affinities and probable Habits of the extinct Australian Marsupial, *Thylacoleo carnifex* OWEN," Quarterly Journal of the Geological Society, vol. xxiv., 1868.

‡ Proceedings of the Linnean Society of New South Wales, 8vo., 1883, p. 187 ("On Tooth-marked Bones of Extinct Marsupials," by CHARLES DE VIS, B.A.).

CHARACTERS OF THYLACOLEO CARNIFEX.

The extirpating cause of the *Felis spelæa* together with the huger Herbivores (*Elephas*, *Rhinoceros*, *Megaceros*, *Bos primigenius*), represented by remains in British caverns, may be inferred to have operated in relation to the analogous evidences in Australia. That cause I conceive to have been Prehistoric Man.]

DESCRIPTION OF THE PLATE.

PLATE 46.

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| Fig. 1. Os innominatum, | <i>Thylacoleo carnifex</i> , nat. size. |
| Fig. 2. Ib. | <i>Macropus major</i> , $\frac{1}{3}$ nat. size. |
| Fig. 3. Ib. | <i>Felis Leo</i> , do. |
| Fig. 4. Ib. | <i>Thylacinus cynocephalus</i> , $\frac{1}{2}$ nat. size. |
| Fig. 5. Ib. | <i>Diabolus ursinus</i> , do. |

Fig. 1.

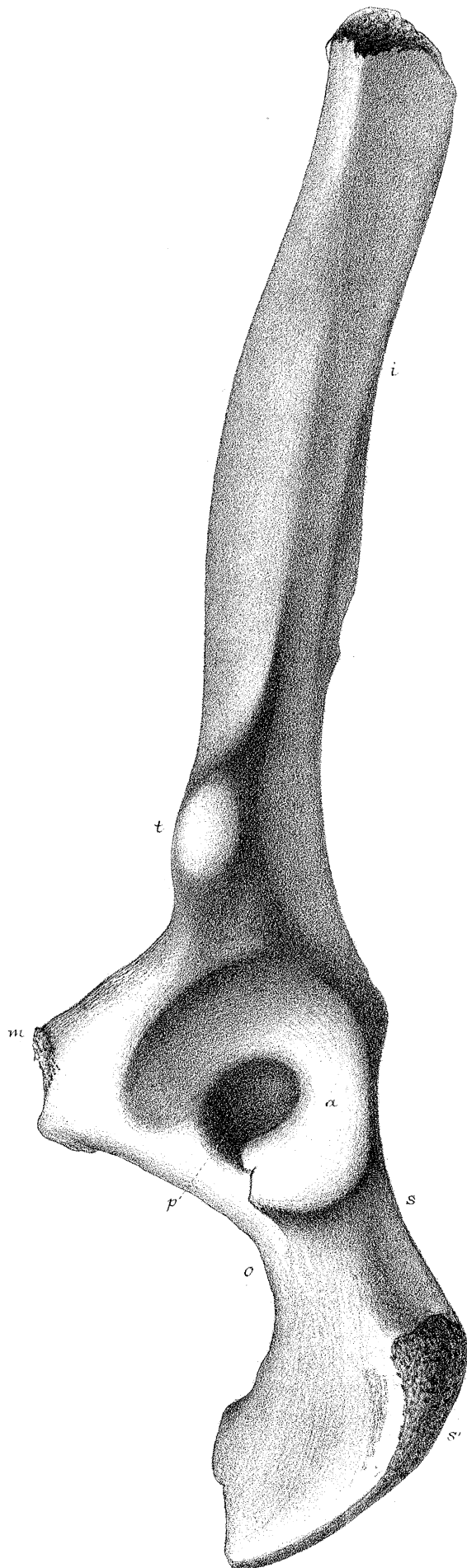


Fig. 2.

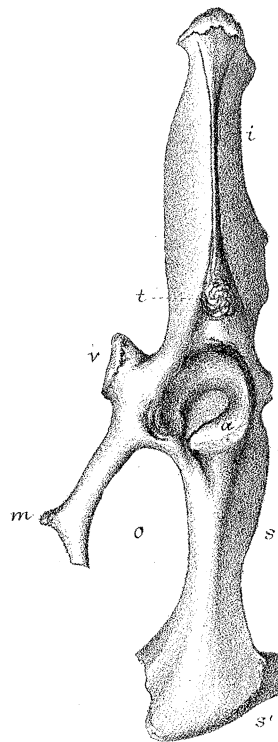


Fig. 4.

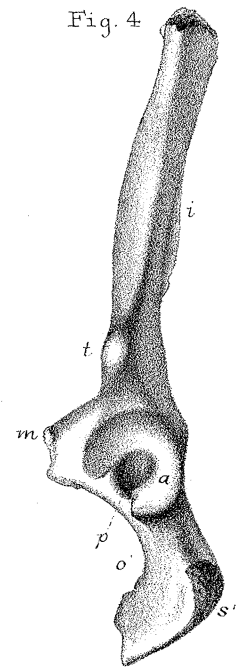


Fig. 3.

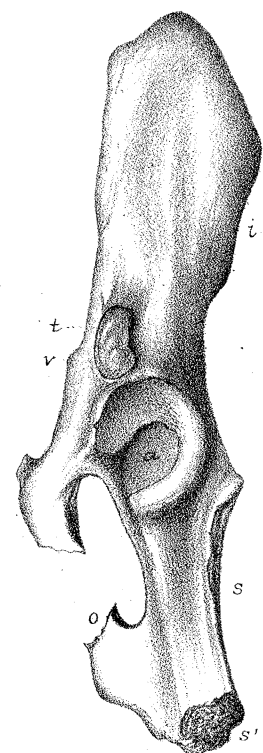


Fig. 5.

