Natural History.

A Cuvierian Principle in Palæontology, tested by evidences of an extinct Leonine Marsupial (Thylacoleo carnifex). By Professor Owen, F.R.S., D.C.L., Foreign Associate of the Institute of France. Reviewed by Gerard Krefft, F.L.S., C.M.Z.S., M.F.D.H., &c.

Professor Owen spoke boldly when he thus headed his last treatise on the Extinct Mammals of Australia, too bold in fact, because if the "Cuvierian Principle in Palæontology" is once found wanting, it must be reduced in value ever afterwards. The founder of a science is not always able to provide at first for all the exigencies which may arise out of a careful investigation of his system, and the worship of learned men may go a little too far. It is right to love the master who taught us, and I admire Professor Owen on that account; but when anatomists like Flower, Falconer, and Huxley differ from Cuvier as they differ from Buffon and Linnæus, Professor Owen will probably reconsider his verdict and make the *amende honorable*. Cuvier and his principles cannot always be depended on in the classification of Australian fossils, and I refer those interested to Sir Thomas Mitchell's "Three Expeditions," where, on plate 32 of vol. II., the author remarks "The two figures, 12 and 13, represent, on a reduced scale, the large bone which M. Cuvier supposed to have belonged to a young elephant."

It was evidently Fr. Cuvier who could not distinguish between the femur of a "gigantic kangaroo" and that of an elephant, and we are justified in discarding Cuvierian principles as far as fossil marsupials are concerned.

Professor Owen may say that the bone figured by Sir Thomas Mitchell is *not* a kangaroo bone, but it never was the femur of an elephant, and if not a kangaroo it certainly belongs to a marsupial animal closely allied to it. All the other objects represented on the same plate are either wrongly named or not named at all. Did M. Fr. Cuvier inspect these bones also? Did Professor Owen notice what they really are? Fig. 1 is the ulna of a wombat. Fig. 2 a block of limestone nodules with a few wombat phalanges (toe bones) in it. Fig. 3 is a much worn lower incisor of a gigantic kangaroo. Fig. 4 and 5 are two views of a right upper first incisor of a Thylacoleo. Figs. 6, 7, 8, and 9 are different views of the right lower incisor of Thylacoleo. Fig. 10 represents the much-worn right third premolar of a Thylacoleo, the very tooth which the author of the "Extinct Leonine Marsupial" constantly terms the great carnassial, and which was of so little importance to him in 1836 that he never referred to it in his report on the Wellington fossils.

If these teeth did not strike Professor Owen in 1836 as uncommon, why are they considered valuable evidence of carnivority in 1858 or 1859? In that year I think the first attempt was made to fit some fragments of a Thylacoleo's skull into such a shape as to

ments of a Thylacoleo's skull into such a shape as to produce a cat-like head. (Cyclopædia Britannica, Art. Palæontology, p. 175, fig. 115.) Let any unprejudiced person examine the impossible restoration of that head, and he will at once see that the author had a preconceived opinion about it, evidently trying to form the remains into the skull of a carnivore.

I consider these remarks necessary before reviewing Professor Owen's paper, and they will show—1st, that the chief part of the Thylacoleo's dentition was known to him as far back as the year 1836; 2nd, that there was nothing very extraordinary in the size or formation of the teeth, otherwise Professor Owen would have noticeed them long before; 3rd, that, having once pronounced a certain opinion, the author has been reluctant ever since to modify or alter it; 4th, and last, that the principal in palæontology laid down by the great Cuvier, cannot be applied with confidence or successfully in the classification of our fossil marsupial animals, which were not discovered when Cuvier wrote.

The authorities against Professor Owen are Professor Flower, F.R.S., the eminent lecturer at the Royal College of Surgeons, the late Dr. Falconer, Mr. Boyd Dawkins, and the discoverer of the missing teeth, who first pointed out their real position in skull and mandible—myself.

It is a well-known fact that in highly carnivorous animals the exposed portion of a tooth is completely covered by enamel. This is not the case with the Thylacoleo's incisors (which Professor Owen considers designed to "pierce, retain, and kill!) They are almost destitute of enamel on their flat inner surface, and are, comparatively speaking, less formidable than the upper and lower front incisors of the striped Phalanger known as *Dactylopsila trivirgata*, the nearest ally (as far as incisors are concerned) to the Thylacoleo.

The corresponding pair of front teeth in the *Belidæus flaviventer*, or "yellow-bellied flying squirrel," are more like the Thylacoleo's teeth in their structure, but they are not so largely developed as the teeth of the *Dactylopsila* which, comparatively speaking, has the largest incisors of any marsupial animal living or extinct, though only a fruit and leaf-eating Phalanger.

The dental formula in Thylacoleo is as follows:—

Incisors.	Canine.	Premolars.	Molars.	
6	1—1	3—3	1—1	
—	—	—	—	=28
2	0—0	3—3	2—2	

Professor Owen, to suit his peculiar system, arranges these teeth in this manner:—

Incisors.	Canine.	Premolars.	Molars.	
2—2	1—1	4—4	1—1	
—	—	—	—	=30*
1—1	0—0	4—4	2—2	

If the author will kindly examine the upper incisors of a common Bettong (*Bettongia rufescens*) and compare therewith the Thylacoleo incisors (which I sent him), and which he figures under wrong names, he will at once perceive that the "leonine marsupial" had a large pair of front incisors (which correspond as before stated with those of *Dactylopsila* or *Belidæus*), and a second and third pair behind the first which are

before stated with those of *Dactylopsila* or *Belidæus*), and a second and third pair behind the first which are almost identical in form with those of the Bettong just mentioned. The first tooth in each upper ramus is curved, compressed, and almost destitute of enamel on the inner side; the second tooth is conical, with a short thick produced crown, showing a transverse mark made by the lower incisor; the third tooth again is curved, three-sided, and inserted in such a manner that the sharp angle stands inwards. Professor Owen, disregarding my careful investigations, freely communicated to him, figures it constantly as a "canine." (Pl. xi., figs. 10, 11, and 12.) The conical second incisor—fig. 13 of the same plate—he names the "first upper premolar, outer side," though he figures the small tubercular premolars with their nail-headed crowns (pl. xi., fig. 2, p. 2-3) right enough.

The upper canine puzzles Professor Owen considerably, as it did myself when I first found loose specimens of it. This tooth, which encroaches further into the palate than is usual (and is sometimes almost covered by the first premolar and last

* The two or three little teeth which occupied the empty sockets behind the anterior part of the third incisor are still unknown; we do not even know whether they were two or three in number. These teeth are met with in all phalangers proper, but are seldom found perfect.

incisor), has a curved tapering fang and a heart-shaped flattened crown. Mistrusting my observation, the author again calls it "the second incisor" in one instance, and the second upper premolar in another (figs. 9 and 14 of pl. xi.)

I make these statements with confidence, and will explain why:—

Every tooth which Professor Owen figures on pl. xi., from No. 9 to 14, was collected by myself and transmitted to him, as my list and photographs will prove. These teeth are not from a Breccia Cave, but from "*the Breccia Cave of Wellington Valley*," and they are what I stated them to be, and not what Professor Owen designates them in his treatise.

I have known the teeth for years to be those of Thylacoleo, and I have reconstructed the skull with all the teeth in it in 1869. This plate, lithographed by Mrs. Forde, was printed at the Government Printing Office in 1870 with seventeen other plates of fossil remains (by Miss Scott and Mrs. Forde), which, however, for want of funds, have never been published. I was desired to give Professor Owen all the information I could, and I kept nothing back, but for some reason or other the most typical specimens, of which I could send *photographs only*, are not figured in his paper.

The illustration of a tooth—pl. xi., No. 6—named "crown of a less worn upper laniary, outer side," which means "a left first upper incisor," should have been drawn from the *inner side* as well, so as to show the absence of the enamel. Compared with Sir Thomas Mitchell's figure in the "Three Expeditions" (fig. 5 of pl. 32), the fallacy of Professor Owen's argument as to its laniary, i.e., flesh-cutting

tions" (fig. 5 of pl. 32), the fallacy of Professor Owen's argument as to its laniary, *i.e.*, flesh-cutting character, becomes at once apparent.

Professor Owen is careful to give us three views of a much fractured specimen of the right upper jaw from Queensland, in which the most interesting teeth—the second and third incisor—are missing, and the canine is fractured. He uselessly figures also a fractured mandible—plate xiii, fig. 2, a more complete one, having been given above it (fig. 1). He carefully avoids to enlighten his readers by supplying a sketch of the upper teeth belonging to fig. 2, of which the canine and two hinder incisors were almost perfect. These teeth are figured exactly in the position in which they were found imbedded in stiff moist loam. Having unfortunately broken the skull and mandible into fragments with my pick, I called Dr. Thomson and Harry Barnes to my aid, and pointed out the position in which the teeth lay imbedded, asking friend Thomson to take notice of it, so that there should be no dispute about the matter hereafter. To myself the arrangement of the teeth was known from other specimens obtained on former occasions, but Dr. Thomson had never seen them together, and we both sketched their position. There is nothing wrong in the arrangement of the teeth in the rejected photograph, except that the sharp edge of the 3rd incisor should be more inward, and the canine should, of course, be partly hidden by the 3rd incisor and the 1st small premolar. We had just removed the teeth, when Harry Barnes blew the candle out to prevent some uninvited visitors from coming down the shaft. These inquisitive "gentlemen" were too far, however, for retreat, and, bewildered by the sudden darkness, brought their bodies and some ten tons of loose breccia on the top of our "diggings," and so prevented us from finding the rest of the skull. Professor Owen's left incisor, No. 6 of plate xi, looks very much like the fellow to my right hand one. Having carefully removed the dirt and the "dirty visitors," I had another examination of the moist clay, and found the condyle, which resembles that of a Koala, or native bear."

It is necessary to go thus into particulars, and as Professor Owen will not believe me, I must speak out myself. Twisting or turning will not alter what I stated to be the truth, and I feel confident that time and Professor Flower, F.R.S., will prove the correctness of my observations.

I have been in the habit of consulting Professor Owen's works on our marsupials, and I have always found he has given it as his opinion that the first tubercular tooth behind the lower incisor of a Phalanger must be considered to represent the canine. As late as the year 1868 he teaches this, and he gives examples of such teeth in the "Anatomy of Vertebrates," vol. iii, page 289, figs. 228 and 229; the last represents the dentition of *Phalangista Cookii* (our "Red Ringtail Opossum.") In this figure the large incisor is the first tooth of the series, then follow three small tubercular teeth, the first of which is distinctly marked "canine."

It has been proved that all Phalangers proper have three premolars above and below, at some time or other of their existence, but

have three premolars above and below, at some time or other of their existence, but in the face of this evidence laid down by Professor Owen, as well as by Flower and others, the great anatomist now turns these three little teeth into "premolars," and alters the premolar formula of Phalangista to *four* below, whilst he retains only three above. (See "A Cuvierian Principle, &c.," p. 254, fig. 19. Right mandible of *Phalangista Cookii* with four premolars, and without a canine).

I make no comments on this strange alteration to suit a certain purpose, which, if accepted by anatomists, will confuse everything Professor Owen has taught about the dentition of the genus Phalangista. The first tooth after the incisor in the mandible of a Phalanger is most undoubtedly a canine, and it will remain a canine as long as there is truth in comparative anatomy. Even if every other tooth is marked with a "p" (premolar) it will never be believed by those who understand these things, and the teeth will be called, as hitherto, by their right names given by Professor Owen himself. If we examine the depressions, two or three in number on the front inner side of the large premolar of Thylacoleo, it will be observed at once that they probably contained two or three little teeth, like other Phalangers, the first of which would of course represent the lower canine.

Thus far the herbivorous principle is prevalent, but with the true molars reduced to a pair below, one of which is tubercular, and to a single transverse tooth above, the somewhat carnivorous character of the animal becomes manifest. The carnivority is still further expressed in the position of the line of mandibular teeth, which exactly fronts the ascending ramus, but there again the carnivorous proof ends.

From the shape of the condyle, placed moderately high, and from the broad scoop-like inward process of the lower jaw, we conclude the Thylacoleo to have been a mixed feeding or herbivorous animal.

On page 236 of the treatise "A Cuvierian Principle in Palæontology" we read in plain words, "The rotatory grinding movements of the mandible are commonly associated with a high position of the condyle and vegetable diet; the vertical biting movements are commonly associated with a low position of the condyle and animal diet." This is not quite correct, the condyle of the herbivorous Phalanger known as *Dactylopsila trivingata* being lower than the row of grinding teeth.

On April the 19th, 1870, I wrote to Professor Owen, saying—"The carnivorous character of our friend Thylacoleo is greater than I first thought it was. I firmly believe the cast of a condyle I sent you

* A cast of a similar condyle, with portion of the inflected angle, was dispatched to Professor Owen as far back as 1863 or 1864. A year or two afterwards I pointed out that the cast sent *must be* that of the missing part of the Thylacoleo's mandible. I had good proof of my assertion, but the proposition was not entertained by Professor Owen.

is that of this animal." These remarks were made when I had noticed the row of teeth to be in a line with the ascending ramus, which is a more or less carnivorous character in marsupials.

June 13, 1871, evidently too late for the paper under discussion, I wrote again:—"Regarding the Thylacoleo I wish to assist you as much as possible to arrive at a correct determination of the animal's character. I sent you already what I consider the condyle and angular process, in fact the very part which is missing. *If you choose to believe me*, it is the identical left posterior portion of the jaw, whereof we possess the right anterior one also. The jaw is very much like that of a Koala, and the condyle resembles it more than that of any other animal." With this letter I dispatched a series of careful tracings of my sketches, including one of an upper canine of a tiger, and the lower incisor of a Thylacoleo, for comparison.

Nearly a year has passed since this letter was written, and my opinion of the character of the animal under discussion being a mixed feeder, allied to the Phalanger tribe, is more and more confirmed. There is no occasion for me to fall back upon the Purbeck fossils, or to ransack all the countries under the sun for allied forms, I have only to examine the numerous recent skulls of *our* marsupials collected for a purpose like the present during the last twelve years, and I am *able to* form a very good idea of the "leonine marsupial."

I believe, and am ready to prove presently, that the *Thylacoleo* contained in its structure certain characteristic parts from each of our principal marsupial groups. Let me describe the upper jaw: The first pair of curved incisors resemble those of the *Belideus flaviventer* or "yellow-bellied Flying Phalanger." The next pair, as well as the third, are as near in shape to those of the "Bettong" as can possibly be imagined. The canine, with its compressed crown, is also "Bettong-like," and differs considerably from that of the Phalangers proper. The disposition of the incisor teeth is the same as in the "Bettong," the curved 1st incisor arching above the close packed second and third one. All these teeth vary considerably, and indicate several distinct species; the canines are as irregular in their structure, and lead to the same conclusion. The short functionless first and second premolars do not indicate great carnivorous propensities, and they are not near so formidable looking as those of our Phalangers.

I mentioned before that the upper canine stands far back into the palate, and is often completely covered by its neighbours. With regard to the third premolar, Owen's "carnassial tooth," it will be found in form, position, and function to be identical with the third premolar in the common *Phalangista volpina* in *Cuscus maculatus*, and in other more or less carnivorous Phalangers. This tooth is often worn in a far greater degree than Professor Owen imagines, and specimens now in his hands will sufficiently prove it. No "formidable carnivore" would be able to make an

how in his hands will sufficiently prove it. The "formidable carnivore" would be able to make an impression on "hide and flesh" with such "grindstones." I have no more appropriate word to offer when describing the worn condition of some of the many specimens examined by me. The upper, first and only molar, is a shallow-rooted, distorted, flat, rugged tooth, with a depression in the middle, and evidently designed for grinding or crushing, never for mascerating flesh.

Looking at Professor Owen's figure on plate XIV. (Phil. Trans. 1871), I notice the old tendency to make the animal as carnivorous as possible. The first upper incisor has the form of a "parrot's beak," and is probably *not* quite true to nature; the indicated second incisor is far too small, and the tooth which he terms a "canine" is out of shape and out of place where Professor Owen has put it. The upper front teeth of a Thylocoleo are closely packed, there is not a line of space between them; the canine is perfectly crowded out, and stands back into the palate as Professor Owen's drawing plainly shows; but he will call this real undoubted "canine" the "first premolar" and I shall say no more.

Description of the lower jaw:—This part settles all our disputed points, and turns the supposed "lion" into a leaf-eating Phalanger. The front view of it, given on plate XIII, fig. 3, is too broad; the incisors should not close together at the tip, but remain considerably parted, as their marks against the second pair of premolars clearly indicate. Professor Owen says, to illustrate the power of these weak incisors (p. 228), "Were a pair of bayonets cemented side by side, and the force of two brawny arms concentrated on the thrust, their perforating and lethal power would be increased." The Professor is right enough in his conclusion, but his premises are wrong. The flat lower incisor teeth of our animal are *not* cemented close together; on the contrary, their attachment is remarkably weak, and the symphsis of the mandibles is *not* firm and compact as that of a koala or a wombat. We find plenty of wombat jaws in a fossil state with both incisors present; even perfect jaws are not uncommon, and wombat jaws, as a rule, seldom part at the symphysis; but not a single Thylacoleo jaw has ever been found under such conditions. The wombat is the only marsupial animal which in compactness, shape, and biting power can at all be compared with our "lionized friend," and the "formidable carnivore" was only as large again as a common wombat. We know fossil wombats considerably larger than the Thylacoleo, and having experienced the impressions of the teeth of some recent ones, I make confession that they bruised the part nipped considerably, but did not draw much blood; they crush but do not tear. The koalo bites sharper and resembles the Thylacoleo more, but like the wombat and unlike the "marsupial lion," it has much firmer jaws, and were it as large as the Thylacoleo, would be more formidable. The average form of a koalo's lower incisors differs considerably from the *blunt* specimens specially collected by Professor Owen, probably for other than Australian readers, and figured on page 233, No. 6, of his treatise. The real carnivorous marsupials have always a series of small

carnivorous marsupials have always a series of small incisor teeth inserted between the canines, which resemble those of ordinary placental carnivores. The most formidable, the Thylacine, or Tasmanian tiger, and the black Dasyure, were numerous in post pleiocene times, and that they did their duty well in checking the increase of the great herbivores (which were "calves" at some time of their existence) is evident enough from the marks which their strong teeth left on some of the fossil bones. Animals with Thylacoleo dentition could not make such impressions.

If dingoes find no difficulty in destroying cattle, the great Dasyures were as able to overpower Diprotodons of respectable size, so that the Thylacoleo was not *required* for that purpose. But I am not going to speculate.

The general form of the lower jaw of our marsupial friend is undoubtedly that of a Phalanger. The flattened and but partly enamelled lower incisors are exactly represented by the incisors of *Belideus* and *Dactylopsila* even to their serrated edges; the diminutive canine and one or two premolars are the old story of the Phalanger dentition over again, and the great third "carnassial" premolar resembles, as in the upper jaw, the outwardly produced formidable tooth of the common Phalanger. No person who applied the laws of comparative anatomy correctly would fall into the mistake of supposing the Thylacoleos's large premolar to be closer related to that of the Rat Kangaroo than to the Phalangers, and if I once mentioned *Thylacoleo carnifex* as a "gigantic Kangaroo Rat" in one

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of the Trustees' Annual Reports (as Professor Owen is careful to point out), I beg to assure him that this was done to give the general reader of such documents some idea of what was meant. I must try and speak in terms which the public can understand, and avoid as much as possible all *scientific names* for which English equivalents are at hand. The remaining teeth in the lower jaw are a triangular, posteriorly depressed molar, and a very small functionless tubercular tooth closes the series. The line of teeth is in a line with the rising ramus, and in this and in the form of the first molar I discern relationship with the *Dasyuridæ*. Several of the mandibles in the Museum collection shew clearly at the point where they are broken off, that the jaw widened out inwards and upwards like that of a wombat, to which, in this respect, the Thylacoleo was also related; the upward direction of the wombat's jaw from the base of the ascending ramus is very abrupt, and it may have been the same with the Thylacoleo. There is a foramen (small opening) at the base of the ramus which also occurs in the wombat and koala and in all the kangaroos in a larger degree, but is never found in a true marsupial carnivore. The articulating condyle is irregular, large, rugged, and rounded; it resembles the condyle of the native bear or koala, and

condyle is irregular, large, rugged, and rounded; it resembles the condyle of the native bear or koala, and will be found (when discovered) *attached to a perfect ramus* to be a moderately high placed condyle associated with the rotatory movements of the jaw, just as in herbivorous marsupials and herbivorous placentals. (See Owen's "Cuvierian Principle," p. 233.) I do not see the use of discussing the arguments of Professor Owen in favour of the existence of a "leonine marsupial" any farther; I only remind him of the fact that our really carnivorous marsupials from the smallest Antechinus to the largest Thylacine resemble each other; that all have six lower incisors like the placental carnivores, "which hold the canines well apart," and strengthen them for the purpose for which they were designed; that all possess a low condyle, and always a sharp pointed—never a broad and rounded—inflected angle below it. In not one of them has a foramen been noticed at the base of the *coronoid*, and all have rounded strong canines, which, in particular the upper ones, are covered with thick enamel; whilst the teeth of the Thylacoleo are compressed, and the upper incisors possess little or no enamel on the inner and lower surface. The true carnivorous type is always the same, whether we consider the placental or the marsupial orders. There is no more difference between a small marten-cat and a tiger than there is between the minute Antechinus and the largest Thylacine; teeth and jaw are constructed on the same principle, and no teacher knows this better than Professor Owen.

But the Thylacoleo stands not isolated. I can prove several distinct species, and I have already discovered a much smaller allied form described under the generic term of *Plectodon*. Of this genus I can also demonstrate three species at least.

On the 2nd April, 1870, I dispatched, by direction of the Trustees, two cases of specimens (2100 in number) to Professor Owen, No. 846, of which was the right lower incisor of a *Plectodon*. Professor Owen never mentions this, the most interesting specimen in the whole series, though it bears considerably on the question at issue, and I doubt not we shall hear of it at some future time. I kept photographs of it to prove its identity with my duly-established genus *Plectodon* whenever this becomes necessary.

I must bring my remarks to a close, however, though there are numerous errors yet to be corrected.

Making every allowance for Professor Owen's want of specimens, I am surprised to read the following sentence:—(P. 243) "In the *Bettongia penicillata*, with such worn incisors, and with all the molars in place, and showing a habitual use, the trenchant premolar retains its vertical groovings to the cutting edge of both the outer and inner sides. They have been used to divide the grass blades and leaf-stalk, or other tough part or fibre of the vegetable food; but the more important and continuous work of mastication has had grinders in number, size, massiveness, and complexity of horizontal area fitted to perform it. Old age is attended with seeming exceptions to this rule in both human incisors and hypsiprymnal premolars, which then show the wear or work of life."

I draw the attention of Australians to table case A.

work of life."

I draw the attention of Australians to table case A, section 4, in the new wing of the Museum, where "hypsiprymnal" and "bettongial" (fossil and recent) premolars may be seen, in which not only the premolars, *but the following three molars* are worn "Thylacoleo fashion," leaving not a vestige of the vertical grooves.

Much worn human incisors are by no means rare in the skulls of our collection, and in a particular one, found at Bondi, all the teeth are ground down to the roots. This remarkable wear is caused by the chewing of certain reed or bulrush roots (*Typha schuttleworthii*), for the purpose of getting at the starch between the fibres and to obtain the fibre itself, which spun or twisted, was used by the aborigines to prepare fishing, duck, and wallaby nets.

I can guess pretty well the age of native skulls, often brought here, by examination of the teeth, because the practice of chewing typha fibre has ceased with the introduction of twine. I may have misunderstood Professor Owen regarding the wear and tear of incisor teeth; if he means to say that they *do wear* with age my remarks are superfluous. I regret that Professor Owen has so little faith in my observing power; and more so that it is so difficult to convince him of his errors. I have explained to him by way of long letters, photographs, casts, and original specimens that the genus *Zygomaturus*, established by the late Mr. W. S. Macleay, must be retained, because the mandibular teeth of the animal, which he has named *Nototherium*, are totally different in shape and structure from those of Mr. Macleay's creature. Those who are able to do so may compare them (Cat. Royal Coll. Surgeons, Mamm. and Aves, plate VIII, fig. 5, *Nototherium* and Proceed. Geo. Soc., vol. XV, plate VII, fig. 1). Professor Owen is again and again referring to Mr. Macleay's genus under the designation of *Nototherium*, and as my own generic and specific terms have been superseded sometimes in the most off-hand manner by badly informed naturalists, I consider it my duty to keep facts such as these before the public. Professor Owen says (p 263) "No evidence of a megatheroid or other edentate animal has been had from any cave or fossiliferous deposit in Australia. The ungual phalanges (plate XIII.) figs. 11, 12, 13, 14) are too small for *Nototherium* and *Diprotodon*, if even one were to entertain the idea of those huge marsupial *Herbivora* having had sheathed, compressed, decurved, pointed claws like those which the phalanges in question plainly bore. These phalanges are much too large for the *Thylacinus* and *Sarcophilus*. But there is no other associated carnivore corresponding in size with that of the animal indicated by them save the Thylacoleo."

When sending the photographs and casts of these "claw-bones," I said to Professor Thomson "We shall have some fun depend upon it, Owen will claim them as "*Thylacoleo* claws," just as he claims Macleay's *Zgomaturus* to be the part to which the *Nototherium's* mandibles belong." Good, clever, liberal, and obliging Professor Thomson is gone to his long home, and Professor Owen has not disappointed my expectations.

long home, and Professor Owen has not disappointed my expectations.

The claw to which I more particularly refer as being that of a "megatheroid animal" and, which, with its next joint is deposited in the Australian Museum, where it may be inspected (table case C) is what I stated it to be "the ungual or terminal phalangx of a creature allied to the Mylodon." The upper face of the sheath is naturally open, and the next joint is short and thick, like some of the phalanges of Professor Owen's *Mylodon*. (See "Memoir of Mylodon," plate xv. and xvi.)

I am not going to try and prove what this claw is *not* like, as Professor Owen does. I only draw attention to the probability that there were in olden times, as at the present day, small *Edentata* as well as large ones, and as I first discovered the presence of fossil edentate Monotremes in this country, I may be allowed to say, with the evidence before me, that animals allied to the *Mylodon* will yet be found. I am very careful in my statements; I respect Professor Owen, and am ready to serve him at any time, whatever difference there may be in our opinions. I have cast my lot with Australians these twenty years, I had opportunities like few persons living to study our fauna, and will not give in, because it must be proved first that I am wrong. I shall always strive to deserve the high compliment which Professor Owen, as well as Professor Flower, have paid me regarding my ability as the Curator of the Australian Museum, and I hope that, like the tattoo marks in "Tichborne v. Lushington," my postscript will settle the disputed point.

Postscript.—In drawing a few of the lower incisors of "Thylacoleo" last night for the purpose of giving illustrations of them in a future issue of the *Sydney Mail*, I noticed, to my astonishment, clear evidence of attrition on the inner side of several. There was no doubt about it they had touched each other during the lifetime of the animal (as kangaroo teeth do), but generally at the tip only. In one specimen, however, the surface of the inner side was observed to be quite smooth to the extent of *one inch* on the lower margin. The ridge so prominent in young or immature specimens had totally disappeared, and my supposition that the jaws were loosely attached is clearly borne out. Professor Owen lays great stress on the sharp points of all the lower incisor teeth found in a perfect state, and as he makes this an argument in favour of the carnivority of our now "unmasked," friend, I may as well state why the teeth are not worn down: Every one of our *upper* incisors of Thylacoleo has the under surface—against which the lower teeth work—scooped out; and even in young animals the teeth-marks are plainly visible, and not a vestige of enamel can be seen. Is it a wonder that the incisor teeth keep perfect so long as they are not violently broken of, and will Professor Owen continue to call this probably

feet so long as they are not violently broken off, and will Professor Owen continue to call this probably handsome, and certainly harmless creature, with "trembling jaws," the fellest of savage carnivores? How bears "the Cuvierian principle" an ordeal with animals which Cuvier did not know and did not dream of? The test has been applied, and human vanity is exposed again.—Sydney, May 15th, 1872.