

A RE-EXAMINATION OF THE SKELETAL CHARACTERS OF *WYNYARDIA BASSIANA*, AN EXTINCT TASMANIAN MARSUPIAL.

By

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Plate V. and Ten Text Figures.

(Read 8th September, 1930.)

Thirty years ago (P.Z.S. 1900, pp. 776-794) Sir Baldwin Spencer described and named the fossil Marsupial that had been brought to light by a fall of the cliff face at Table Cape, Tasmania.

Since that time *Wynyardia* has taken a definite place in all speculations concerning the phylogeny of the Marsupials, and has lent support to more than one hypothesis dealing with the history of the Australian Didelphians and their route of entry into the island continent.

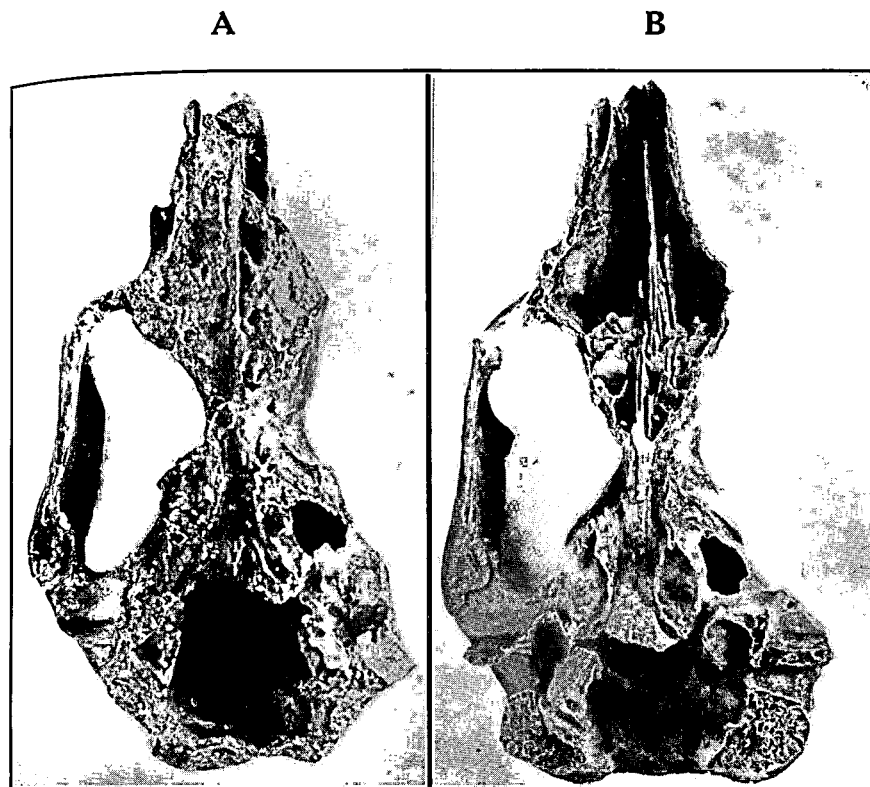
Some years ago an examination of the cast of the fossil suggested to me the advisability of a reinvestigation of the characters of the animal, but the cast appeared to provide an inadequate basis upon which to conduct such a study.

During a visit to Hobart in 1925 I discussed with Mr. Clive Lord, Director of the Tasmanian Museum, the possibility of submitting the original specimen to a thorough re-examination and of providing a series of dioptrographic drawings of the fragments.

Upon my return to Australia in 1930 this was made possible by the kindness of the Director and Trustees of the Tasmanian Museum, who permitted me to have the most important fragments of the skeleton in my charge in Melbourne. I greatly appreciate the liberal policy that dictated this action, and rendered the present study possible.

GEOLOGICAL AGE OF THE SPECIMEN.

The specimen was originally "embedded in the Turritella-zone of the marine beds of Table Cape" (Johnston, Geology of Tasmania).



Basal view of the skull of (A) *Wynyardia* and of (B) *Trichosurus* mutilated to about the same extent.

Note the alveolus of the upper central incisor in both skulls.

At the time of its discovery, Australian geologists were in very general agreement that the *Turritella*-zone of Table Cape was definitely to be assigned to the Eocene period, and this deposit, as well as the Spring Creek beds of Victoria, were regarded as being "at the base of the series." (G. B. Prichard, "A revision of the fossil fauna of the Table Cape Beds, Tasmania." Proc. Roy. Soc. Vict., 1895, p. 74). By Tate, however, the Table Cape beds were, even at the time of the discovery of the fossil, diagnosed as most probably belonging to the Oligocene. (R. Tate, Trans. Roy. Soc. S. Aust., XXIII, pt. i, p. 107.) In the thirty years that have elapsed since Sir Baldwin Spencer wrote his paper, considerable attention has been devoted to the study of the Table Cape and Spring Creek beds; and it appears to be certain that we must revise our opinions as to the age of the fossil.

Chapman, in particular, has devoted a great deal of detailed study to beds of the so-called Janjukian age, and according to these latest and most intensive investigations the Janjukian deposits of Table Cape must be assigned to a period no older than the Miocene. (Frederick Chapman, Mem. Nat. Mus., Melb., No. 5, 1914; Brit. Ass. Sect. C. No. 144, 1914; Proc. Pan. Pac. Sc. Cong., 1923, p. 985.) By Howchin it is considered probable that the fossil belongs to a period no older than the Pliocene. ("The Building of Australia," Part II., 1928, p. 438.) It seems obvious, therefore, in the light of these most recent researches that we must regard *Wynyardia* as being a far more recent form than was supposed at the time of its original examination.

THE SKULL.

GENERAL CHARACTERS.

In general outline the portions of the skull preserved in the specimen resemble very strikingly the similar parts of a rather large skull of the Tasmanian form of the large Phalanger—*Trichosurus vulpecula fuliginosus*. With this animal it has been thought best to compare the fragments of the fossil, and figures 1 to 4, which are diptrographic drawings made to the same scale and drawn in the same plane, provide a basis for such a comparison. There are, however, some noteworthy differences between the two skulls.

Compared with *Trichosurus* the fossil shows:

- (a) A relatively larger brain case,

- (b) An unusually long anterior prolongation of the sagittal crest, and
- (c) A complete lack of inflation of any of the cranial bones.

The other features noted in the original description as being striking peculiarities, such as the large size of the lachrymal and squamosal elements, and the width of the nasals, are dealt with as they arise.

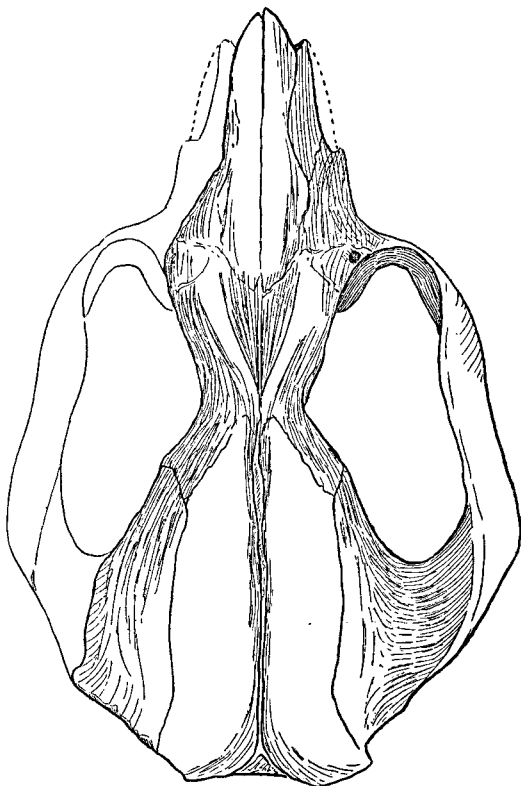


Fig. 1. *Wynyardia bassiana*.

Dorsal aspect of the skull. (Diopetrographic drawing.) (Natural size.)

In order to institute comparisons with the skulls of various recent Marsupials, Spencer took the nasal-occipital length of the fossil and the estimated maximum breadth across the zygomata. The relation established was 100 : 67,

and this high ratio of breadth to length was considered as a character that separated *Wynyardia* from the diprotodont marsupials and allied it with the polyprotodonts. I am inclined to think that 100 : 65 would be a more accurate estimate for the ratio in *Wynyardia*. When comparison is made with the skulls of various diprotodonts it is at once apparent that *Wynyardia* is by no means peculiar in this ratio.

Examples of *Trichosurus vulpecula fuliginosus* show a ratio of 100 : 61, and *Bettongia lesueri* 100 : 63. But the ratio of the fossil is exceeded by *Aepyprymnus rufescens* with 100 : 69, by *Petaurides volans* with 100 : 70, and by *Petaurus breviceps* with a slightly higher ratio. The cranial cavity of the fossil is relatively large when comparison is made with certain recent marsupials; it is larger than that

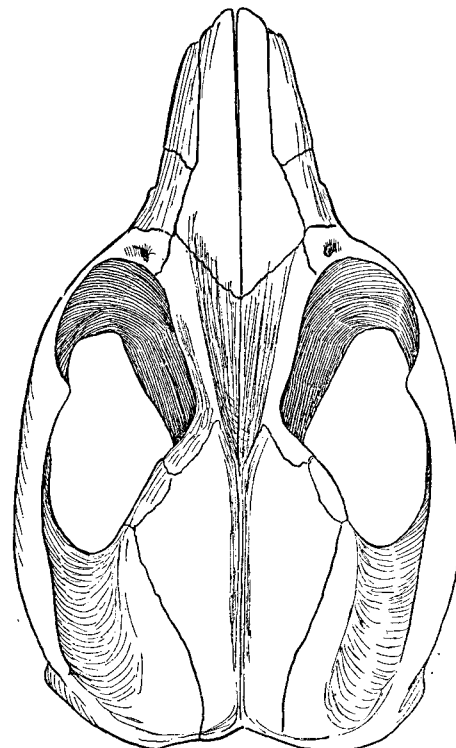


Fig. 2. *Trichosurus fuliginosus*.

Dorsal aspect of the skull. (Diopetrographic drawing.) (Natural size.)

of the skull of *Trichosurus vulpecula fuliginosus* selected for comparison; but that "the relative size of the brain was "greater than in existing marsupials" cannot be maintained when comparison is made with many types not included by Spencer in his survey.

Spencer's figure for the length, breadth, and height of the cranial cavity of the fossil are 58, 33, and 26. If we take *Æpyprymnus*, the same measurements (adjusted for an equivalent skull length of 100) are as high as 71, 47, and 36. *Wynyardia* indeed can claim but little distinction even from many specimens of *Trichosurus* in this regard, for the equivalent measurements of some skulls are 58, 32, and 25.6. Certainly on the strength of this evidence it is not just to claim, as Spencer does, that the brain of the marsupials has possibly "retrogressed, from a former higher development in *Wynyardia*."

In reviewing the whole gross characters of the skull it must be admitted that singularly few really noteworthy characters are displayed which tend to differentiate it from that of a modern Tasmanian phalanger. That it shows characters unlike those of any recent marsupial, or that it possesses features typical of, or peculiar to, the Polyprotodonts, as claimed by its original describer, are contentions that the findings of the present investigation do not support.

THE INDIVIDUAL CRANIAL BONES.

The Periotic.

In the original description it is said that the structure of the periotic "is quite unlike that of any other marsupial." The outstanding peculiarities upon which stress is laid are its relative small size and its distinctions in form. On comparison with the same element in a skull of *Trichosurus* of comparable size, it can hardly be maintained that the periotic of the fossil is unduly small, when allowance is made for the portions that have been broken and lost. Nor is there any conspicuous difference in the form of the bone itself, although the much more complete encapsulation of the floccular fossa in the recent animal causes a somewhat different general appearance of the topography of the part. Both the ossified tentorium and the capsule of the floccular fossa appear to be diminished in the fossil, even when allowance is made for the breakage of these thin pieces of bone.

To the present author it seems that it is the differences manifested in the surrounding parts, particularly in the

excavation for the floccular fossa, far more than any real differences in the form of the periotic itself, that account for the rather different appearances of this region of the skull when *Wynyardia* is compared with *Trichosurus*.

In *Bettongia*, *Potorous*, and *Æpyprymnus*, where the tentorial ossification and the excavation of the floccular fossa are less than in *Trichosurus*, the gross likeness to *Wynyardia* is greater; but this affects the general topographical resemblance rather than the intimate features of the periotic, and with these the parallel would certainly seem to be with *Trichosurus*.

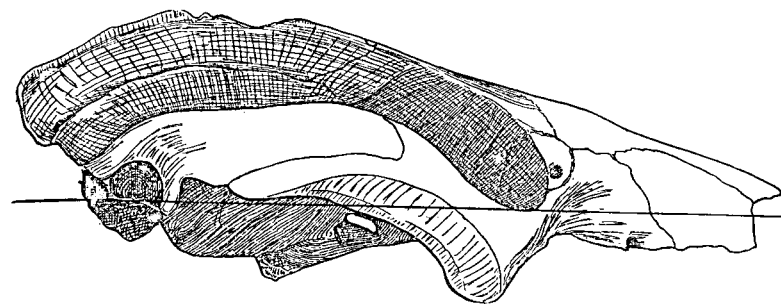


Fig. 3. *Wynyardia bassiana*.
Lateral aspect of the skull. (Dioptrographic drawing.) (Natural size.)

So exact is this parallel that it is impossible to cite any character in which the periotic of the fossil differs from a similarly mutilated bone of a recent specimen of *Trichosurus*.

The Glenoid Fossa.

The characters of the glenoid fossa were originally described as having features most nearly resembling those present in *Thylacinus*. This comparison was instituted mainly on the features displayed by the post-glenoid process. In the form of the post-glenoid process, and especially in its independence from the tympanic, affinities were claimed with the polyprotodonts generally. The form of the process is, however, typical of that of the majority of the diprotodonts, and it is difficult to determine any feature that distinguishes it from the corresponding portion of bone in *Trichosurus*. Its supposed distinction from that of *Trichosurus* lies in its apparent independence of the tympanic. It must be remembered, however, that fusion of the post-glenoid process and the posterior wall of the external auditory meatus is by no means typical of the diprotodonts, for in many forms it

never takes place, and when it does occur it is a purely secondary process carried out only with advancing age. Even in the adult skull of *Trichosurus* the separation of the two elements is easily effected, and in *Æpyprymnus* and in the Macropods generally, independence of the post-glenoid process is maintained throughout life. The transverse elongation of the glenoid cavity provides no differential character from the diprotodont condition; it does not exceed that typical of *Trichosurus*. (See Plate V.)

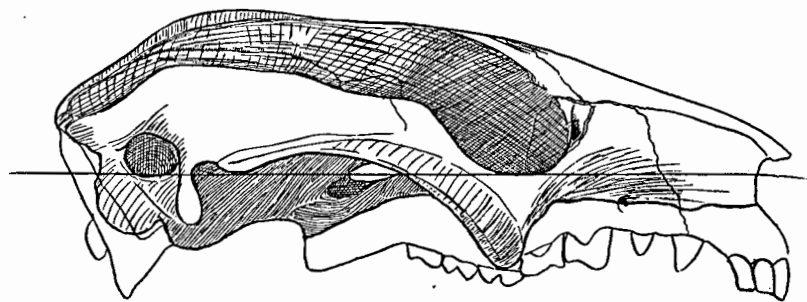


Fig. 4. *Trichosurus fuliginosus*.

Lateral aspect of the skull of an adult male. The parts missing from the skull of *Wynyardia* are indicated in outline. (Diopetrographic drawing.) (Natural size.)

The Squamosal.

In the original description much stress is laid upon the great size of the squamosal: "The squamosal is indeed "larger than in any existing or fossil marsupial yet known; "and its forward extension completely prevents the alisphenoid from coming into contact with the parietal." The anterior limits of the squamosal are difficult to detect in the fossil, and this is so because, in all probability, the suture line between the squamosal and the alisphenoid is obliterated.

Such fusion of the squamous and alisphenoid is of frequent occurrence in the skulls of mature examples of *Trichosurus*. The marking, which, in the original description, is taken as forming the separation between the two elements, is, in the present interpretation, assumed to represent the vertical portion of the pterygoid or infratemporal ridge. (See Fig. 5.) This ridge is situated upon the alisphenoid, and a marking almost identical in detail with that of the fossil is present in *Phalanger*; whilst in *Tricho-*

surus, although the horizontal ridge is always present, the vertical portion is variable.

Since then it is assumed that the alisphenoid-squamosal junction postulated in the original description is in fact the pterygoid ridge on the alisphenoid, it remains to be determined if any of the suture line between the two bones has escaped complete obliteration and can be detected in the fossil. I am of the opinion that traces of the suture may be followed upon the lateral wall of the skull on the left side, and in front of the glenoid fossa upon the right side.

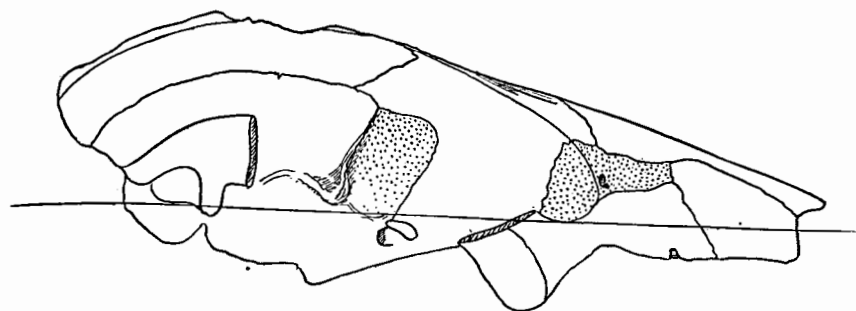


Fig. 5. *Wynyardia bassiana*.

The alisphenoid and lachrymal elements as determined in the original investigation. (Natural size.)

It is to be noted that in the original description, when dealing with the features of the cranial cavity, the following identification is made:—"The sella turcica has no posterior "clinoid process, and from the foramen rotundum of each "side a well-marked groove leads back to the gasserian fossa, "the outer edge of the groove being formed by the projecting "ridge of bone which is developed from the alisphenoid in "the tentorial plane."

There can be no doubt as to the correctness of this diagnosis; and the fact that the ridge is present on the inner side of the bone diagnosed as squamosal on the outside of the skull, strengthens the present claim that the suture line between the squamosal and alisphenoid was wrongly determined in the original description. It is, therefore, claimed that the alisphenoid element is determined as shown in figure 6, a disposition that differs in no essential way from that typical of *Trichosurus*, *Phalanger*, and many other living diprotodonts.

With regard to the squamosal suture, the fact that there "is a general parallelism of the upper part of the suture of the squamosal with the sagittal crest" is justly emphasised in the original description.

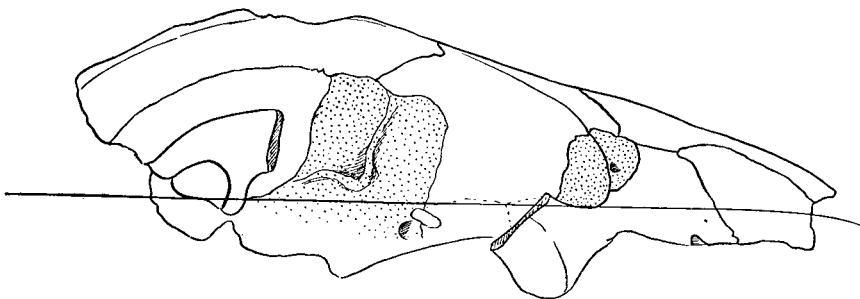


Fig. 6. *Wynyardia bassiana*.

The alisphenoid and lachrymal elements as determined in the present investigation. (Natural size.)

Herein the fossil differs considerably from the adult *Trichosurus*. (See Figs. 1 & 2.) But it must be observed that the convergence of the caudal extremities of the sutures in *Trichosurus* is a very variable feature, and one depending upon age and the degree of inflation of the temporal. In the young *Trichosurus* the two sutures are situated as in *Wynyardia*; and in *Phalanger* the condition is practically identical even in the adult. A similar parallel disposition of the squamous sutures is also present in *Bettongia*, *Potorous*, and *Æpyprymnus* among the diprotodonts.

The most pronounced distinction of the temporal bone of the fossil is the entire absence of any inflation with air cells, such as is a conspicuous feature in the skulls of most adult members of the *Phalangeridæ*.

The Lachrymal.

The description of the lachrymal is somewhat confused in the original account. Among the striking features of the skull (pp. 778-9) there is included:—"The large size of the lachrymals, which meet the nasals and prevent the maxillæ from coming into contact with the frontals." This is a perfectly correct statement, but it constitutes no peculiarity, for the condition described is variably present in *Trichosurus* and in *Phalanger*; and as it exists in *Wynyardia* it is a common feature in the skulls of both these living genera. But on page 781 it is said:—"The lachrymals

"are of large size, and extend upon the face to such an extent that, owing partly to the width of the nasal bone, they come into contact with the latter, and so prevent the upward process of the maxilla from reaching the nasal." It is further said that:—"This feature is also met with in *Phascolomys*," but in that animal the lachrymal does not meet the nasal, and the maxilla articulates with both the frontal and the nasal. It is, therefore, somewhat difficult to determine if the original identification of the lachrymal element was that it only extended forwards so as to exclude the maxilla from contact with the frontal or if it was supposed that it went still further and excluded the maxilla from contact with the nasal. (See Fig. 5.) There is no sort of distinction for *Wynyardia* in the first case, and it can therefore only be supposed that the second diagnosis was intended.

Fortunately, there can be no sort of doubt as to the condition present in the fossil. The suture lines are clearly defined, and are correctly placed by the artist in the plates accompanying the original description. The facial portion articulates with the frontal and the nasal, and excludes the maxilla from contact with the frontal; and that is the state of affairs very usual in *Trichosurus*. (See Fig. 6.) The lachrymal bone of the fossil is, therefore, in every way similar to that of the living diprotodonts, and has an actual identity with the bone as it occurs in the living *Trichosurus*.

The Frontal.

The frontals in their outline and articulations are almost precisely as in *Trichosurus*. The fact that they are wider in their cranial than in their facial portion, as stressed in the original description, is important; but it cannot be even in adult examples of *Trichosurus*, and in the skulls of admitted as in any way a distinction peculiar to *Wynyardia* among the marsupials. The condition is met with at times younger animals it is constant. The cranial width of the frontal portion of the skull of *Wynyardia* exceeds that of any actual skull of *Trichosurus* with which I am able to compare it, and the condition is brought about partly by the somewhat more caudal extension of the frontals in the fossil than in the recent forms. In such diprotodont genera as *Potorous* and *Æpyprymnus*, however, the breadth of the cranial portion of the frontal always exceeds that of the facial portion in a very marked degree.

It is, therefore, not just to claim, as is done in the original description, that in this feature *Wynyardia* differs from all known recent marsupials.

The excavation of the frontals by the anterior bifurcation of the sagittal crest differs only in degree from that present in recent *Phalangeridæ*; and it is difficult to see in it any definite approach to the condition seen in the polyprotodonts.

The Nasal.

The nasals differ in no way from those of *Trichosurus*. The expansion of the caudal extremities (which was claimed as a striking peculiarity in the original description) is in the same region as, and does not exceed, that of *Trichosurus*. The long anterior extension of the nasals in advance of the premaxillæ is exactly as in *Trichosurus*, and is a feature diagnostic of the *Diprotodontia*.

The Maxilla.

The maxilla in every feature agrees with that of *Trichosurus*, save that the infraorbital canal is situated further forwards in the fossil. In *Trichosurus* the foramen is usually situated about mid-way between the anterior and posterior borders of the bone; in *Wynyardia* it is situated at about the junction of the anterior third with the posterior two-thirds of this distance.

The Premaxilla.

The premaxillæ are, as Spencer justly remarks, "approximating most in form to those of *Trichosurus*." From the premaxillæ alone it would be justifiable to deduce the fact that the animal had no real resemblance to any polyprotodont, and that its incisors must have been large and of the type usual in the diprotodonts. Spencer continues: "It is most unfortunate that the lower part of the premaxillæ should have been broken away at such a level as to leave no indication of the exact nature of the teeth." As a matter of fact the premaxilla still carries very decisive evidence of the nature of the upper central incisor. A small area of the alveolar cavity for this tooth is perfectly preserved and retained in the specimen; indeed it is distinctly recognisable in the figure (Plate XLIX., Fig. 2) illustrating the original description by Spencer.

This portion of the alveolus remains when the premaxilla of a recent skull of *Trichosurus* is fractured at the same level. (See Plate V.)

In the light of this evidence it appears to be certain that *Wynyardia* was, in fact, a typical diprotodont, and that it possessed an upper central incisor of very much the same type as that present in the living *Trichosurus*.

SUMMARY OF CRANIAL CHARACTERS.

The whole of the characters of the skull are best dealt with in the form of a summary of the differential characters as determined in the original investigation with comments upon them in the light of the present re-examination.

A. Characters in which the skull of *Wynyardia* was claimed to differ from that of all recent marsupials.

- (1) The greatest breadth of the frontals is in the cranial part.

Comment. This condition is typical of many diprotodont marsupials.

- (2) The anterior position of the infraorbital foramen.

Comment. The position is very variable in existing genera of diprotodont marsupials.

- (3) The structure of the petiote.

Comment. No real structural differentiation from the typical marsupial form of the bone.

- (3) The great relative size of the cranial cavity.

Comment. Considerably exceeded in some living diprotodont marsupial genera.

Finally, every peculiar feature of the foramina and of the general form and articulations of the constituent bones of the skull is so typically that of a didelphian mammal that there can be no hesitation in diagnosing it unreservedly as belonging to that sub-class of the mammalia.

B. Characters in which the skull of *Wynyardia* was claimed to differ from the *Diprotodontia* and resemble the *Polyprotodontia*.

- (1) Proportionate length to breadth of skull 100 : 67—decidedly greater relative width than is present in diprotodonts.

Comment. Relative width exceeded in many living diprotodonts.

- (2) Lambdoidal crest well developed.

Comment. The same feature present in *Trichosurus*.

- (3) Sagittal crest well developed.

Comment. The same feature present in *Trichosurus*.

- (4) The form of the zygomatic arches.

Comment. No real distinction from many diprotodonts.

- (5) The transverse elongation of the glenoid fossa. The downward produced plate of bone which forms the boundary is not connected with any structure forming part of the auditory passage.

Comment. Exactly as in many typical diprotodonts.

Finally, it must be added that the characters of the premaxillæ; the remaining portion of the alveolus for the upper central incisor; the absence of any alveolus for an enlarged canine (which would certainly have been evident in the broken maxilla); and the long overhang of the nasals, definitely rank the skull of *Wynyardia* among the specialised Australian diprotodonts.

The Mandible.

The fragment of the lower jaw has been broken in a singularly unfortunate manner, for the alveolus of only one tooth is to be identified beyond all doubt. Such characters as are definitely shown by the fragment are in entire agreement with the supposition that the whole mandible was formed upon the general lines of the same bone of *Trichosurus*. (See Fig. 7.) It is difficult to appreciate the features that, in the original description, led to the conclusion that the jaw was of a peculiar type, or that it showed resemblance to that of *Perameles*. The broken alveolar cavity for the roots of the third molar is clearly retained in the fragment, but there is no indication of the sockets of the anterior cheek teeth. With regard to the lower central incisors it is said in the original description (p. 784) that:—"Either there were "no largely-developed incisors, or else the symphysis was "a remarkably long one, as there is not a trace of any "sockets at the anterior end." It may be that the knowledge of the existence of *Trichosurus*-like upper central incisors

has influenced the views of the present writer, and so biased him in favour of a possibility of detecting the alveolus of a large lower incisor. Such a consideration is borne in mind throughout this discussion. A mandible of *Trichosurus*

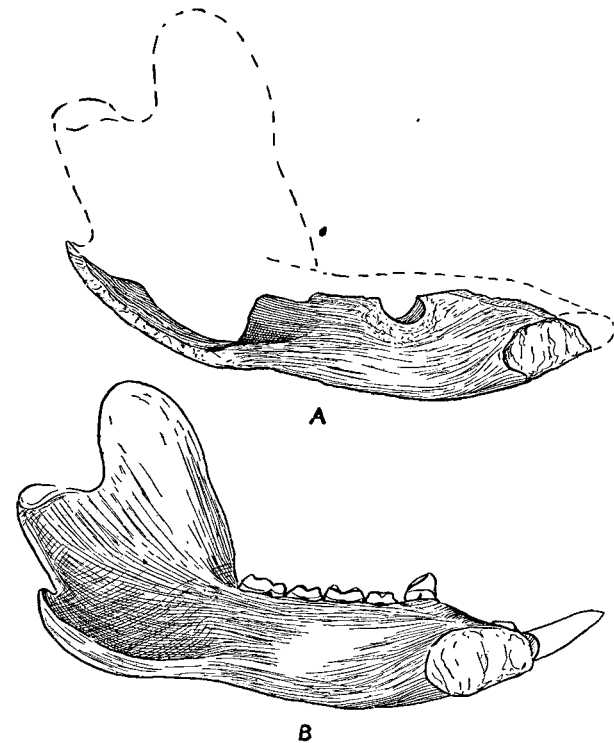


Fig. 7. Mandible of *Wynyardia* (A) and *Trichosurus* (B). (Diotrographic drawing.)
The probable missing parts of *Wynyardia* are inserted in dotted line.
(Natural size.)

mutilated to the same extent as the fragment of *Wynyardia* appears to show very clearly that the incisor alveolus of the fossil is filled completely either with the mineralised matrix, or with the incisor root, but that, nevertheless, the boundaries of the alveolar cavity are more or less clearly defined.

The point must remain in some doubt; but the area occupied by what is here diagnosed as matrix, or incisor root, coincides so exactly with the empty incisor socket of the jaw of *Trichosurus*, i.e., from the region of the symphysis

to the anterior end of the exposed dental canal, that there seems to be a high degree of probability that the absent lower incisor did not depart widely, if at all, from the type present in the living *Phalanger*.

As for the curious depression that involves the alveolar margin in the region of the second lower molar tooth, it is almost impossible to conceive of its being a normal anatomical feature. As a normal feature it finds no parallel anywhere among the mammalia, and the suggestion that it corresponds to some peculiarly-developed tooth of the maxillary series has no support from the whole experience of mammalian morphology. In the original description the pathological nature of the depression was considered and rejected; but, despite this finding, it would seem that the most probable diagnosis was an alveolar abscess cavity at the root of the second molar tooth. Such abscess cavities are by no means uncommon in the diprotodonts, both in the wild state and in captivity; and the depression, with its thickened margins, presents characters practically identical with those of root abscess cavities in examples of *Petrogale*, *Onychogale*, and *Macropus* in the writer's possession. Again, in this, as in other characters, sea wear must be taken into account.

THE VERTEBRAL COLUMN.

The Axis Vertebra.

The axis vertebra, though somewhat damaged, is preserved sufficiently completely to permit some very definite conclusions as to its form. A considerable degree of importance was attached to the characters of this bone in the original description, and it was concluded that in several ways rather wide differences were shown from the type present in recent marsupials.

Compared with the corresponding bone of *Trichosurus*, it is seen to be generally more massive, more strongly ridged, and to possess transverse processes that are not sloped so markedly in a caudal direction. It may be open to doubt if the whole of the delicate transverse process is present in the fossil, for, although its extremity shows no obvious sign of being broken, it must be remembered that the skeleton was exposed to the action of the sea long enough to permit a barnacle 18 mm. in diameter to grow upon the sacral fragment.

Although the slope of this transverse process is by no means so acute as it is in *Trichosurus*, it can hardly be claimed that its axis "is nearly at right angles to the body of the vertebra" (p. 790). It would seem more correct to say that, whereas in *Trichosurus* the angle is in the region of 30, in *Wynyardia* it is about 40. (See Fig. 8.)

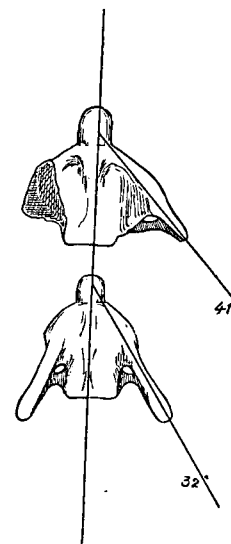


Fig. 8. The axis vertebra of *Wynyardia* (above) and *Trichosurus*. (Diptrographic drawing.) (Natural size.)

The Sacrum.

The sacrum is too much broken to permit any valid deductions as to its original form.

The Vertebrae.

Only fragments of isolated vertebrae were submitted for re-examination (the remainder being embedded in the matrix). Among these portions there were no recognisable characters of diagnostic value.

The Pelvis.

Although the skull appears to show few, if any, characters that differ in any fundamental way from those of the living *Trichosurus*, the pelvis departs considerably from the type characteristic of the *Phalangeridae*. (See Fig. 9.)

Its distinctions are mainly confined to the ilium; for the ischium appears to have been, in every essential character, an enlarged and more massive model of the *Trichosurus* type. The ilium differs from that of *Phalangeridæ* in its more prismatic form; the lateral surface being strongly marked off from the anterior and posterior surfaces. In this, and in other characters where a departure is seen from the phalangerine condition, an approach is made towards that seen in the macropods.

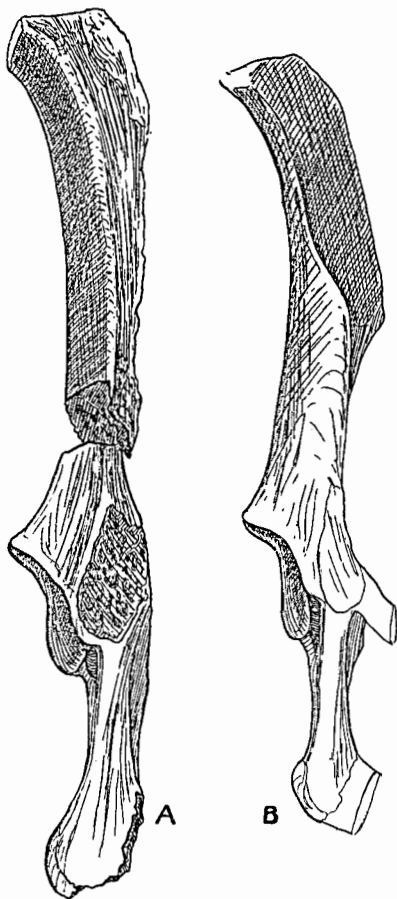


Fig. 9. Right side of the pelvis of (A) *Wynyardia* and (B) *Trichosurus*. (Dioptrographic drawing.) (Natural size.)

The sacral articular surface is, unfortunately, broken away, as is also the whole of the pubic portion of the pelvis. From the existing portions it would seem most probable that the greatest departure from the *Trichosurus*-type lay in the robust nature of the *Wynyardia* pelvis, combined with a disposition of the gluteal muscles that differed essentially from that present in the living arboreal *Phalangeridæ*.

The Femur.

The greatest distinction of the *Wynyardia* femur is its massive build. When compared with the corresponding bone

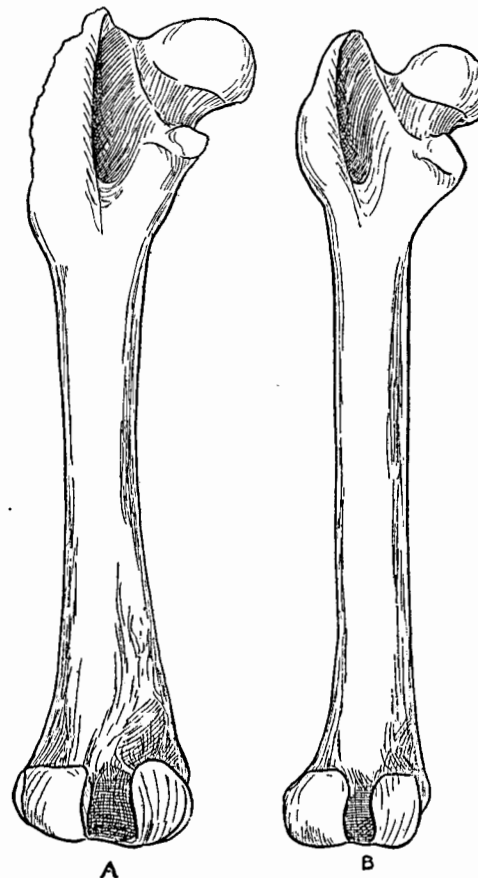


Fig. 10. Posterior aspect of left femur of (A) *Wynyardia* and (B) *Trichosurus*. (Dioptrographic drawing.) (Natural size.)

of *Trichosurus* it is at once obvious that, though the femur is no longer than that of the living animal, it is in every way far more robust. (See Fig. 10.) Apart from this general distinction there is the special character, to which Spencer called attention—the relative great width of the internal condylar facet. But, although this feature constitutes a well marked distinction from the condition met with in *Trichosurus*, it is not without its parallel in such terrestrial diprotodonts as *Macropus*.

In another feature, the flattened and down-bent head of the femur, a closer approach is made to the terrestrial macropods than to the arboreal phalangers. We may, therefore, say that, though the femur departs from the form typical of the phalangers it displays no non-marsupial characters, such as were originally claimed for it.

The Tibia.

Save for its massive build and the fact that the inner condyle (in harmony with that of the femur) is unduly large, the tibia of *Wynyardia* presents no essential difference from that of *Trichosurus*.

The fibula was not included among the bones submitted for re-examination.

From those portions of the vertebral column and of the pelvis and the pelvic limb submitted to re-examination it is not possible to deduce any non-marsupial characters or any that preclude the conclusion that *Wynyardia* was definitely a fully differentiated Australian diprotodont. We may deduce, however, that it was a sturdily-built creature, considerably heavier than the living *Trichosurus*, and probably differing from that animal in habit and in bodily poise.

SUMMARY AND CONCLUSIONS.

The re-examination of the remains of *Wynyardia bassiana*, and a consideration of the more recent findings of Australian palæontologists, permit of the following conclusions:—

- (1) The animal must be regarded as a member of the Janjukian Miocene or Pliocene fauna, and not as an early or basal Eocene form.
- (2) It is, in all its essential characters, a typical member of the didelphian Sub-Class of the Mammalia. It shows no character that differentiates it from

recent marsupials (and it must be remembered that one of the "marsupial bones" was present when it was first described by Spencer).

- (3) It shows no feature that excludes it from the *Diprotodontia*, and it must be regarded as already a fully-developed and typical Australian diprotodont, and in no way as an annectant from between *Polyprotodontia* and *Diprotodontia*.
- (4) It shows so many resemblances to the characters of the living genus *Trichosurus* that it must be considered as an ally of the Phalangers; but
- (5) The sturdiness of its limb bones and the differences in the muscular impressions make it probable that its gait and habit differed markedly from those of the modern lightly-built arboreal animals.

These findings are, in the main, in direct opposition to those of the original examination made thirty years ago.