A REVIEW OF THE FOSSIL JAWS OF THE *MACROPODIDÆ* IN THE QUEENSLAND MUSEUM.

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(Plates xiv.-xviii.)

The motive to the present inquiry was a desire to ascertain whether additional light might not be thrown on an interesting portion of the Nototherian fauna by the large number of Macropodine jaws, rescued from time to time from the drifts of the Darling Downs, which have been reduced to specific order. It was a task attempted some years ago, and promptly laid aside: partly on account of the uncertainty attaching to the identification of specimens with the types described and figured by Owen: partly in view of the existence of species unknown to that author and the necessity of giving them maturer consideration: partly in the desire to gather a larger body of illustrative material: partly in the hope that when the Volume of the British Museum Catalogue of Fossil Marsupials should be published the labour of determination would be greatly eased. As that hope has been in a measure realised, and as once fertile sources of accumulation have temporarily ceased to be productive, the local investigator, though still compelled to trust very much to his own material and his own judgment, ventures upon the work.

Preparatory to the examination of so considerable a number (over eleven hundred) of dissociated jaws and portions of jaws, wherein specific differences are obscured by that general resemblance in molar form which pervades their several groups, it seemed judicious to ascertain, as far as possible, the nature and range of the variations, individual and specific, in living Macropods which are exemplified by the fossil jaws notwithstanding their imperfections. Provision has therefore been made of skulls of several kinds of Kangaroos and Wallabies in number sufficient to yield reliable estimates of dimensional extremes and averages within the species, and accurate views of the extent of likeness and difference in form and size maintained among themselves by the species. Information of this kind has been obtained from 479 skulls, namely, of *Macropus giganteus* 80, *M. rufus* 9, *M. robustus* 39, *Halmaturus parryi* 55, *H. agilis* 29, *H. dorsalis* 88, *H. ruficollis* 50, *H. coxeni* 9, *H. thetidis* 19, *H. wilcoxi* 2, *H. stigmaticus* 3, *H. ualabatus* 8, *H. browni* 1, *Onychogale frenata* 4, *Petrogale penicillata* 70, *Dendrolagus lumholtzi* 3. Furnished with this instruction and with a resolution to be chary of assuming anything of a fossil which may not be predicated of a similar living species, it may be possible to thread the maze before us with more confidence in the progress made than would be permissible were the clues less frequent.

Since the mutilations to which the fossil remains have been subjected diminish in number the available points of comparison between them and recent jaws, those data only have been asked from the latter which are given with more or less constancy by the former.

As to measurements, the following are those which have been found the most useful in practice. The length of the full series of cheek-teeth and its width as represented by that of m^3, the molar most frequently preserved in the fossil state: the length of the premolars, permanent and deciduous: the external length of the mandible from the edge of the masseteric fossa to that of incisive outlet: its internal length from the edge of the intermasseteric foramen to the symphysis: its vertical height, anteriorly at the fore end of the tooth m^1, and posteriorly immediately behind m^4: and the thickness of the bone below m^3. Of less frequent service are the length from the hinder end of the symphysis to the incisive outlet, the length of the diastema, that of the basiocranial axis, the breadth of the palate, and the height of the alveolar process behind the orbit.

The following tables, which may be of some use to others engaged in similar work, are summaries of the measurements taken under the headings which seemed most important. An intention to throw the sexes into separate tables was abandoned when it was found that although the mean size is less in the female than in the male, individual exceptions are so frequent and pronounced that such separation would afford no guidance in an attempt to discriminate between the sexes of the fossils.

All measurements are in millimetres.

LENGTH OF CHEEK TEETH.

	ADULT MANDIBLE.				ADULT MAXILLA.			
	Least.	Greatest.	Number Measured.	Mean.	Least.	Greatest.	Number Measured.	Mean.
M. giganteus			1	48·5	48·1	50·7	3	49·2
,, *robustus*			1	47·4	39·7	53·3	4	47·0
,, *rufus*								
H. parryi	30·5	37·5	16	35·9	37·8	41·5	16	39·0
,, *agilis*	36·0	43·5	13	39·9	40·4	47·2	13	43·7
,, *ualabatus*	34·5	40·0	2	37·2	37·0	42·0	3	38·8
,, *dorsalis*	29	35·3	20	32·0	33·0	37·7	17	35·2
,, *ruficollis*	25·5	37·5	13	34·8	36·0	40·7	14	38·7
,, *wilcoxi*	30·0	31·0	2	30·5	31·3	31·4	2	31·35
,, *stigmaticus*			1	29·5			1	31·6
,, *coxeni*	29·2	32·0	6	30·4	29·2	32·6	5	31·8
,, *thetidis*	29·0	30·5	4	30·2	29·0	31·0	4	30·2
O. frenata	18·0	23·0	3	20·8	25·7	34·5	2	30·1
P. penicillata	28·5	31·7	17	30·0	27·5	34·5	17	32·6

WIDTH OF FORE LOBE OF M.3

	LOWER.				UPPER.			
M. giganteus	6·9	8·9	44	7·6	7·7	10·2	41	8·7
,, *robustus*	7·0	8·0	9	7·6	7·0	9·0	17	8·0
,, *rufus*	8·0	8·5	4	8·2	9·9	10·5	5	10·1
H. parryi	5·4	6·9	38	5·9	6·1	7·6	36	7·0
,, *agilis*	5·7	7·2	19	6·4	7·1	8·6	19	7·8
,, *ualabatus*	6·0	7·1	5	6·4	7·1	9·2	5	7·8
,, *dorsalis*	4·9	6·0	41	5·1	6·0	7·3	39	6·7
,, *thetidis*	4·4	5·4	13	4·9	5·6	6·5	10	5·9
,, *coxeni*	4·5	5·0	7	4·8	5·5	6·5	7	6·3
,, *ruficollis*	5·7	7·2	31	6·3	6·5	8·9	34	7·5
,, *wilcoxi*	4·6	4·6	2	4·6	5·5	6·2	2	5·9
,, *stigmaticus*	4·7	4·9	2	4·8	5·9	6·1	2	6·0
O. frenata	4·1	4·3	2	4·2	5·5	6·3	2	5·9
P. penicillata	4·5	5·5	44	4·9	5·6	6·8	41	6·5

LENGTH OF P.4

	LOWER.				UPPER.			
M. giganteus	...	...	...	...	...	...	...	
,, *robustus*	...	...	...	...	6·3	8·7	8	7·7
,, *rufus*	...	...	...	...	...	...	1	6·8
H. parryi	4·0	5·9	31	5·0	5·1	6·8	16	5·7
,, *agilis*	6·7	8·1	19	7·6	8·7	10·2	13	9·2
,, *ualabatus*	6·1	8·4	4	7.1	6·8	9·9	4	8·2
,, *dorsalis*	5·0	6·5	37	5·5	5·7	7·3	39	6·5
,, *thetidis*	4·2	6·0	9	5·3	5·5	6·1	8	6·0
,, *coxeni*	6·1	6·8	7	6·5	7·0	8·0	5	7·4
,, *ruficollis*	4·0	5·0	24	4·5	5·8	7·6	26	6·6
,, *wilcoxi*	6·6	7·5	2	7·0	6·6	7·5	2	7·0
,, *stigmaticus*	...	...	1	6·0	...	...	1	6·0
O. frenata	2·3	2·6	2	2·4	2·3	2·6	2	2·45
P. penicillata	5·1	6·7	44	5·7	5·8	8·0	42	7·1

	ANTERIOR DEPTH.				POSTERIOR DEPTH.			
M. giganteus	20·2	26·0	33	23·6	20·2	28·5	41	24·6
,, *robustus*	20·0	25·5	11	23·1	18·0	25·1	11	20-8
,, *rufus*	20·0	26·6	5	23·0	17·6	23·0	4	19·9
H. parryi	16·7	20·0	31	18·3	15·0	20·0	51	17·0
,, *agilis*	16·5	21·1	19	18·7	15·7	21·1	13	18·5
,, *ualabatus*	14·3	17·6	5	15·7	13·7	15·8	4	14·9
,, *dorsalis*	12·0	17·5	40	14·6	11·5	17·5	37	13·8
,, *thetidis*	10·0	13·5	20	11·8	10·4	13·5	9	11·9
,, *coxeni*	11·4	13·4	9	12·2	10·1	11·5	7	10·5
,, *ruficollis*	14·9	19·4	32	16·2	14·1	20·0	26	16·2
,, *wilcoxi*	11·4	12·5	2	11·9	11·0	12·5	2	11·7
,, *stigmaticus*	10·5	12·8	3	11·6	10·5	12·4	2	11·4
,, *browni*	...	...	1	10·5	...	...	...	
O. frenata	11·2	11·9	3	11·5	9·0	11·0	3	9·8
P. penicillata	12·0	16·0	44	14·0	8·1	13·9	42	12·6

	THICKNESS.						
M. giganteus	11·7	16·8	45	14·4	...	...	...
,, *robustus*	11·0	14·1	19	12·5	...	...	...
,, *rufus*	13·0	13·7	4	13·2	...	...	...
H. parryi	10·1	12·0	36	11·1	...	...	...
,, *agilis*	10·1	14·2	18	12·5	...	...	...
,, *ualabatus*	9·5	12·1	5	10·4	...	...	...
,, *dorsalis*	9·0	11·0	37	10·0	...	...	...
,, *thetidis*	7·3	9·0	9	8·0	...	...	...
,, *coxeni*	7·1	8·0	7	7·5	...	...	...
,, *ruficollis*	9·5	12·0	32	10·9	...	...	...
,, *wilcoxi*	7·5	8·4	2	8·0	...	...	...
,, *stigmaticus*	7·3	8·0	3	7·6	...	...	...
,, *browni*	...	...	1	7·6	..	...	...
,, *frenata*	5·3	6·6	3	5·9	...	...	...
,, *penicillata*	7·5	10·0	44	8·6	...	...	...

	External Length. Least.	Greatest.	Number examined.	Mean.	Internal Length. Least.	Greatest.	Number examined	Mean.
M. giganteus	86·0	104·7	27	97·66	62·3	76·1	27	66·5
,, *robustus*	75·5	89·0	4	83 55	57·3	71·6	4	67·5
,, *rufus*	85·7	97·0	2	91·3	68·5	72·7	2	70·6
H. parryi	61·1	73·1	16	66·2	49·4	56·6	16	53·6
,, *agilis*	63·2	78·0	13	69·7	38·0	46·4	13	42·0
,, *ualabatus*	55·0	63·7	3	59·1	46·3	54·8	3	49·7
,, *dorsalis*	50·4	70·0	20	58·7	42·5	51·8	20	46·0
,, *thetidis*	42·5	49·0	4	45·7	34·6	41·0	4	37·1
,, *coxeni*	42·2	48·2	6	44·5	34·5	38·8	6	36·5
,, *ruficollis*	60·0	70·8	14	65·1	45·6	56·7	14	51·2
,, *wilcoxi*	44·5	48·0	2	46·2	39·3	41·0	2	40·2
,, *stigmaticus*	...	...	1	44·6	...	...	1	35·0
O. frenata	41·1	43·5	3	41·9	28·5	36·2	3	32·4
P. penicillata	42·2	52·4	18	47·7	35·5	45·8	17	39·8

With respect to form and structure, attention has necessarily been paid to the shape and sculpture of the several premolars and to their periods of rise and fall in terms of the posterior molars: to the shape, properties and accessory furniture of the true molars: and to the form of the lower contour line of the mandible. Occasionally it has been found useful to notice the shape and direction of the lower incisor, the condition of the symphysis, the level of the inlet of the dental canal, the position of the internal orifice of the lachrymal canal, and status of the anteorbital foramen.

A jaw is accounted *adolescent* in which appears the first trace of wear on the hind lobe of the penultimate molar; it is supposed to be *adult* when the same state of wear obtains in the last molar.

When the posterior surface of an upper molar is excavated vertically and the inner lip of the semifuniculate gorge resulting is raised, this lip in the antecedent teeth appears as an *adpressed fold*.

The term *link* is retained for the longitudinal ridge linking together the several lobes, or the front lobes and their respective talons; *valley* is a term convenient in use to indicate the hollows which are constant between the lobes and frequent on the talons. The qualification *elongate* applied to molars implies that those of the lower jaw are on the average *one half* longer than broad, or thereabouts.

With one exception the whole of the fossils have been collected at various points on the Darling Downs.

On the ground that "the characters by which Kangaroos and Wallabies are separated from each other are neither sufficiently constant nor important to found generic distinction upon," we are invited by Mr. Thomas to forego the admitted benefit of keeping them apart. The ease and certainty with which the unlearned bushman distinguishes between Wallabies and Kangaroos by their build, gait, and habits, are derived from a kind of evidence to which we are not accustomed to pay much heed, but—that apart—it appears to the writer that in the behaviour of the premolar we have a distinguishing character of sufficient constancy and importance for our purpose. It is rare to meet with an aged wallaby's jaw with fewer than the whole five cheek teeth in place at once. It is equally rare to find even a recently adult kangaroo jaw with all the cheek teeth together in place. In the one a strong progressive movement of the substance of the jaw carries forward all the teeth, and, unhindered by any fixed impediment on the brink of the diastemal declivity, hurries them over it: in the other the hinder teeth, propelled with far less force against the immovable barrier set up by the premolar, are kept on duty throughout life, or, if an anterior molar ever be lost, it is so by lateral out-thrust or decay *in situ*. The comparative unimportance of the premolar function in *Macropus*, expressed in the feebleness and short duration of these teeth, especially of the so-called permanent tooth, and its high functional value in *Halmaturus*, in which the latter is better developed than the deciduous tooth and is to old age one of the best preserved of the grinders, point to physiological differences between the two groups important enough to render the constant transiency or permanency of the premolars a good diagnostic character.

Allowing then the practical convenience of recognising the genus *Halmaturus* to outweigh a theoretical reason which seems to him to lack foundation, the writer proposes to retain that genus for the present.

PALORCHESTES, Owen.

Palorchestes, Owen, I.* 1874, p. 797.

Molars with talons anteriorly and posteriorly; the anterior of the upper and the posterior of the lower the longer; mid valleys of the upper closed on the inner, or on both sides, by a raised basal rim. Lower molars elongate; their links continuous with the outer angles of the lobes. Anterior upper molars with vertical ridges and folds. Upper premolar triangular, nearly equilateral, transversely bicuspid, with a talon fore and aft; lower oblong, unicuspid, with a long posterior talon which is strongly linked to the lobe. Vascular foramen present in the mandible. Lower incisors procumbent, spatulate. Middle pair of upper incisiors smallest.

Key to the species.

Size larger; cheek-teeth over 110·0 in length, anterior talon of $\underline{p^4}$ short; lobe of $\overline{p^4}$ indented intero-posteriorly .... *azael*

Size smaller, cheek-teeth below 100·0 in length, anterior talon of $\underline{p^4}$ produced; lobe of $\overline{p^4}$ excavated intero-posteriorly.................................. *parvus*

PALORCHESTES AZAEL, Owen.

P. azael, Owen, I. 1874, p. 798; Lydekker, IV. p. 237; Etheridge, V. p. 186.

P. crassus, Owen, VIII. Vol. xi. p. 7, 1880.

Anterior talon of upper premolar in the half worn state indistinct. The lobe of the lower premolar indented on the posterior surface near the inner side of the link; its area of abrasion subquadrate, extended longitudinally. Size large.

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* Numbers like this after authors' names refer to the bibliographical list at the end of the paper.

Dimensions.

Mandibular.—The length of the first three cheek-teeth is 66·1, of the premolar 17·0, of m.^{3} 29·5, of p.^{3}, mp.^{4}, m.^{1}, m.^{2} 60·0. The width of m.^{3} is 19·0. The anterior depth of the mandible is 61·5; the thickness 33·5.

Maxillary.—From figure and cast. The entire length of the cheek-teeth is from 117·5 to 122·5, the premolar diameters 18·0 × 18·0, m.^{1} m.^{2} are 55·5, m.^{3} 31·8. The width of m.^{3} is from 20·5 to 23·1. The breadth of the palate is from 100·0 to 103·2.

The lower molars are proportionately narrow, but not more so than in the existing Macropods, *M. giganteus*, *H. agilis*, and *H. ruficollis.*

Form of teeth.

Maxillary.—The premolar p.^{4} (Pl. XIV. fig. 5) is an almost regular equilateral triangle with convex sides and angles. From a narrow basal rim or talon, which however seems to be restricted to the inner side, the fore end of the crown slopes gently upwards to the horizontally abraded surface of the two cusps. Of these the smaller is placed over the intero-posterior angle, the larger over the middle of the outer side of the base. The cusps are defined by a deep indent between their posterior surfaces, anteriorly by a depression in the inclined plane in front. The posterior basal talon runs from the outer angle to the middle of the hinder surface of the inner cusp. Opposite the posterior indent the talon is long, but behind the outer cusp where it is feebly linked to the middle of the base of that cusp, short.

Molars.—In these as they appear in the cast the anterior basal talons and their linking ridges are distinct, but in the anterior teeth appear chiefly on the inner side, the posterior talons appearing only on the outer; but on the free surface of m.^{4} (Pl. XIV. fig. 6) the hinder talon is seen to extend round to the inner end of the base and to send upwards a strong linking ridge towards the inner end of the crest of the lobe before it. The mesial links run from centre to centre of the lobes which cross the line of the teeth at an oblique angle. The indications afforded by the cast are confirmed and additional information afforded by the anterior molars of a young individual (Pl. XIV. fig. 3) in the comparatively unworn state which preceded the eruption of p.^{4}. The anterior talon of m.^{1} is long and broad and its outer valley is subdivided by a second fore link. The mesial valley is closed on the inner side by a raised basal rim and subdivided by a low linking ridge. A broad tapering fold rises upon the face of the fore lobe flanking the outer valley and a feebler one on the opposed face of the hind lobe. The posterior talon is very short, but, like the anterior, continuous from side to side; from its inner third a broad tapering fold or link rises obliquely upwards on the lobe to the inner end of its crest. M.^{2} has no secondary fore link and no folds rising from the outer mid valley, but in other respects repeats the characters of m.^{1}. In both teeth the inner side of the front talon is broader and deeper than the outer, hence its more persistent appearance in old age.

Mandibular.—P.^{4} (Pl. XIV. fig. 4). The fore end of the lobe has on its inner side a shallow indent terminating below in a small ledge which represents an anterior basal talon. The horizontal surface of abrasion is almost wholly on the inner side of the central line. The link connecting the lobe with the basal talon is wide and elevated. There is a feeble impression behind the middle of the outer surface of the crown.

P.^{3} (Pl. XIV. fig. 1) is oblong with a large basal talon simulating a posterior lobe; this is linked to the lobe proper, but the link is on the outer side ill-defined. Fore end of lobe so impressed on each side as to give it the appearance of possessing a basal talon with a high linking ridge. Crown suddenly dilated over the intero-posterior angle, where a transverse field of dentine shows the part of the tooth in earliest use.

Molars.—(Pl. XIV. fig. 2). With strongly linked basal talons fore and aft, the mesial and anterior links descending forwards from the outer angles of the lobe yield surfaces of abrasion peculiar in pattern.

Succession of teeth.

The two anterior true molars are still but little affected by wear when p.^{4} has reached a forward stage of incubation, and in the lower jaw $\overline{\text{p.}^3}$ is still in position and little worn when the hind lobe of $\overline{\text{m.}^2}$ is well advanced and its fore lobe nearly in use. The upper premolar and last molar are half worn down simultaneously, m.^{1} being at the same time reduced almost to a shell. From these data it would seem that the anterior true molars rapidly develop in the young jaw; that the upper premolar probably rises simultaneously with $\underline{\text{m.}^4}$, and that it persists to an advanced period of life.

The immediate affinities of *Palorchestes* are with *Halmaturus* rather than with *Macropus*.

Examples—nine.

Maxillary.—A cast of the palato-maxillary region of the skull with all the cheek-teeth; original in the Australian Museum. Like the cast, which has the same history and is numbered M. 2573 in the British Museum Catalogue, it is inscribed "*Macropus*," and is without any doubt from the same mould—Portion of a right maxilla of a young example with m.^{1}, m.^{2} and the crypt of p.^{4}—An isolated m.^{4}, an isolated m.^{3}, and an isolated m.^{2}.

Mandibular.—Portion of a left ramus, with p.^{4}, m.^{1}, m.^{2}, aged, vascular foramen distinct—A left ramus with m.^{3} perfect and remains of m.^{2} and m.^{1}, adult, vascular foramen distinct—Part of an isolated m.^{4}—Associated rami of a young mandible with i.^{1}, p.^{3}, mp.^{4}, m.^{2}, from the Peak Downs.

PALORCHESTES PARVUS, n.s.

Constantly smaller than *P. azael*, the cheek teeth measuring less than 100·0. Upper fourth premolar with a distinct anterior talon, lobe of the lower fourth premolar deeply emarginated on the posterior surface of the inner side, its area of abrasion narrow, angular, and extended transversely.

Dimensions.

Mandibular.—The length of the entire series of cheek-teeth is 94·7 (1); of the series of true molars 80·0 (1); of the last three molars 58·3 (1); of the last two 39·4 and 41·6 (2); of the last 22·0 and 22·1 (2); of m.^{2}, m.^{3} 37·0 (1); of m.^{3} 22·1 (1); of m.^{2} 20·2 (1); of the premolar 15·0 (1); of mp.^{4} 18·5 (1). The width of m.^{3} is from 12·3 to 14·2 (7). The anterior depth is 40·6 and 48·3 (2); the posterior from 35·4 to 49·0 (10); the thickness from 21·8 to 29·9 (10).

Maxillary.—The length of the first four cheek-teeth is 55·9 (1); of the first two molars 37·6 (2); of the last two 37·9 (1); of m.^{1} 21·2 and 21·5 (2); of m.^{3} 19·7 (1); of m.^{2} 20·5 and 21·1 (2). The width of m.^{3} is from 15·8 to 16·6 (3). The length of the premolar is 15·0 (1).

The mean widths of m.^{3}, upper and lower, are to each other as 13. 16·2, agreeing very nearly with those in *H. agilis*, *H. ulabatus*, *H. stigmaticus*, and *O. frenata*.

No gradations in size connect this species, which is rather numerously represented, with *P. azael*, to which it stands in much the same relation as does *S. otuel* to *S. goliah*; its inferiority in this respect is therefore characteristic. Not only so, but the differences between two of its dimensions and the corresponding dimensions in *P. azael* transcend the range of individual variation in size which on the testimony of living Macropods can be allowed within a species. The mean widths of m.^{3} in the two are 13 and 18, or an excess in the latter approaching one-half of the former. The greatest living difference is found in *P. penicillata*, where it amounts to a third only; in *H. dorsalis* and *H. wilcoxi* it is still less. Again, the mean anterior depth of the mandible in *P. parvus* 44·4 is in *P. azael* increased by more than one-half, and this far exceeds the nearest living approach to it which occurs in *H. dorsalis* where it is considerably less than one-half. Finally, the premolars of *P. parvus* are relatively much larger than those of *P. azael*.

Form.

Maxillary.—Premolar (Pl. XIV. fig. 8). The anterior talon is well developed. Commencing about the middle of the inner side and passing round the fore end, where it gives off a short but distinct linking ridge, it extends on the outer side, but is there interrupted by a fracture of that side of the crown. The inner cusp is defined by a sharp impression on the sloping anterior surface, and posteriorly by a slight vertical indent between it and the outer cusp. The hinder surface of both cusps descends vertically to the low and narrow posterior talon.

Molars.—In a slightly worn tooth exemplified by m.[1] (Pl. XIV. fig. 7) the anterior talon is on the inner side of the fore link subdivided by a lofty but narrow vertical ridge; corresponding to this an oblique fold on the hinder surface of the fore lobe descends to the mid valley, making a sharp angle at its junction with the mid link; this again is opposed by a faint ridge on the anterior face of the hinder lobe, and is repeated in a similar oblique fold on the hinder face of the hind lobe. On the outer side of the latter is a very strong ridge or fold rising from the outer third of the basal talon to the outer end of the crest of the lobe. The mid valleys are closed at each end by a raised basal rim. In worn teeth the more or less abraded remains of the stronger of the several vertical folds are pretty constantly recognisable. The well developed talons fore and aft and the lateral basal rims give a quadrate, self-contained appearance to the teeth, which is retained to the last.

Mandibulary.—Premolar (Pl. XIV. fig. 9). The inner side of the fore end of the crown presents a broad groove, ending below in a tumid rim, simulating or representing a basal talon; the posterior surface of the lobe internal to the link is excavated, and the surface of wear encroached upon fore and aft is rendered narrow and angular, while it slopes obliquely inwards and rearwards. The hinder talon is long and concave on the inner side, but on the outer half it is nearly filled by the broad linking ridge, which rising upon it ascends with an inward curve upon the extero-posterior surface of the lobe.

Molars.—The anterior talons are very short, the posterior moderately long and connected with their lobes by strong linking ridges. The fore and mid links run from the outer end of the crest of the lobes to the middle of the fore lobe and anterior talon respectively. The lobes are set obliquely to the line of the teeth, and this obliquity combined with the continuity of the end of one lobe with the middle of the next confers upon the series a facies peculiar to the genus.

Upper incisors.—(Pl. XIV. fig. 10.) The arch formed by the series is broad and flat; the teeth increase in breadth from the central pair outwards, but in the figure the relative width of the outer pair has not been duly represented by the artist.

Succession of teeth.

Of this nothing is known, except that the premolar is retained to old age.

Examples—twenty-six.

Maxillary.—A left maxilla with the first four cheek-teeth somewhat mutilated; aged; traces of the vertical ridges remaining—Part of a left maxilla with m.^{1}, m.^{2}; adult; vertical ridge distinct—A right maxilla showing the palate lobe entire; teeth m.^{3} m.^{4}; aged; teeth worn to the base—Part of a right maxilla with m.^{1}, m.^{2}; aged; teeth worn to the base—Fragment of a right maxilla with m.^{3}, adult—Fragment of a right maxilla with m.^{1}—An isolated m.^{1}, young—Part of an isolated m.^{2}.—Greater part of the base of a skull with all the teeth but the premolars well preserved.

Mandibulary.—A left ramus with all the cheek-teeth; adult; vascular foramen large—A left ramus with all the molars, adult—Hinder half of a left ramus with m.^{2}, m.^{3}, m.^{4}—Hinder half of a right ramus with m.^{3}, m.^{4}; aged; vascular foramen—Hinder half of a right ramus with m.^{3}, m.^{4}; aged; vascular foramen—Part of a left ramus with m.^{3}; aging; vascular foramen—Part of a left ramus with m.^{2}, m.^{3}; adult—Hinder half of a right ramus with m.^{3}, m.^{4} imperfect—Fragment of a left ramus with part of m.[1]—A right ramus, teeth destroyed; vascular foramen—Part of a left ramus, teeth destroyed—Isolated tooth, mp.[4]—Isolated tooth, m.[2]—Isolated tooth, m.[4]—A second example, hinder portion of a left ramus, with m.[3], m,[4]; aged.

STHENURUS, Owen.

Sthenurus, Owen, **I**. 1874, p. 264; Lydekker, **IV**. p. 231.

Protemnodon, Owen, *partim*—Owen, **I**. 1874, p. 274.

Procoptodon, Owen,— Owen, **I**. 1874, p. 788; Lydekker, **IV**. p. 233.

An amalgamation of *Procoptodon* with *Sthenurus* is demanded by their verisimilitude of tooth sculpture, and by the occurrence of forms of transition between the two. Owen's reference of the maxilla of *Protemnodon anak* to *S. atlas* has been accounted for by Mr. Lydekker (*l.c.* p. 231).

Lower permanent premolar with an obliquely disrupted lobe forming the posterior moiety of the outer side, the cleft occupied by sinuous and papillary folds. Upper permanent premolar with a broad ledge on the inner side, its cavity traversed by erect folds. Molars short, with ascending tapering, spreading folds incumbent on their surfaces; posterior basal margins tumid but rarely forming distinct talons, mandibular symphysis generally anchylosed; lower incisors generally small, laterally compressed and much less incumbent than in other Macropods. A vascular foramen on the outer side of the mandible beneath one of the posterior molars. Posterior orifice of dental canal generally above the level of the teeth. Palate with large vacuities.

The vascular orifice is in *S. goliah* frequently minute, penetrating the bone at the end of a delicate superficial groove; occasionally in this species it appears to be obsolete. Outside the genera *Palorchestes* and *Sthenurus* it has been observed in but two instances, in one Macropus and in one Halmaturus.

Key to the species.

Longitudinal links of molars elevated, with lateral processes.

Cheek-teeth from 82·5 upwards; hinder surface of molars with few but strong vertical folds .... *goliah*

Cheek-teeth from 76·0 downwards; hinder surface of molars with numerous fine vertical ridges .... *otuel*

Longitudinal links of molars nearly or quite obsolete.

Length of first three cheek-teeth 55·0; links rudimentary; incumbent folds strong and numerous *pales*

Length of first three cheek-teeth from 42·0 downwards; links feeble; incumbent folds feeble.

Incisor elevated, compressed; symphysis anchylosed; mandible thick......................... *orcas*

Incisior procumbent, spatulate; symphysis lax; mandible slender .... *atlas*

STHENURUS GOLIAH, Owen.

Procoptodon goliah, Ow.; Owen, **XXIII**. p. 59; Lydekker, **IV**. p. 234.

P. rapha, Ow.; Owen, **I**. 1874, p. 788; Lydekker, **IV**. p. 234; Etheridge, **V**. p. 190.

P. pusio, Ow., *partim*; Owen, **I**. 1874, p. 788; Etheridge, **V**. p. 190.

P. goliath, Etheridge, **V**. p. 190.

Macropus goliah, Owen, **XXIII**. p. 259.

M. rapha, Flower, **IX**. part ii. p. 721.

Molars with thick lobes, rounded angles, subrectilinear crests and (except as to the upper talons) elevated links. Inner aspect of links and lobes with strong folds, the largest and most constant of them being the outer one on the intero-anterior face of the hind lobe in the lower and intero-posterior face of the fore lobe of the upper teeth. Hinder surface of molars with strong ascending folds, one or two on the lower, two or three on the upper (Pl. xv. figs. 8-9). Upper premolar short with a broad ledge, not extending beyond the posterior three-fifths of its inner side; its cavity traversed by a longitudinal sinuous ridge. Lower premolar subtriangular with a group of sinuous folds within the posterior cleft.

Dimensions.

Mandible.—The entire series of cheek-teeth varies from 82·5 to 93·7 (6); p.^{4}, m.^{1}, m.^{2}, m.^{3} measure 68·0 (1); m.^{1}, m.^{2}, m.^{3} 53·0 (2); m.^{1}, m.^{2} 34·2 (1); m.^{2}, m.^{3}, m.^{4} from 58·1 to 65·5 (2); m.^{4} 22·2 (1); mp.^{4} 13·4 (1). The premolar is from 12·5 to 14·5 (5). The width of m.^{3} ranges from 15·0 to 19·8 (10); its length being from 18·4 to 21·5 (10). The anterior depth of the mandible is from 50·0 to 60·0 (7); the posterior depth from 37·0 to 52·5 (6); the thickness from 34·7 to 42·5 (7). The entire length fore and aft is 147·5 (1).

Maxilla.—The molars m.^{2}, m.^{3}, m.^{4} measure together 51·5 (1); m.^{2}, m.^{3} from 38·5 to 42·1 (2); p.^{3}, mp.^{4}, m^1, m.^{2} 46·6 (1). An immature premolar has diameters 12·0 × 9·4; the milk premolar is 9·2 in length.

With one exception all these dimensions come well within the allowable limits of range in a species. The width of the teeth differs to an extent which is nearly a third of its minimum; this is sensibly greater than in the three living species which show the greatest latitude in this respect—*M. giganteus*, *H. agilis*, and *H. ruficollis*—but the difference is too small to stand as a lone objection to the fusion of *S. rapha* with *S. goliah*.

Form of teeth.

Mandibular.—P.^{4} (Pl. xv. fig. 7.) Generally triangular, with rounded sides and angles, rarely an irregular suboval. Outer surface of crown impressed at its anterior two-fifths or thereabouts, the hinder with a narrow groove near the inner angle. In the young tooth the impression and groove are the terminal limits of an oblique superficial cleft separating the extero-posterior angle from the rest of the tooth, which cleft is traversed and beset by enamel folds and processes; in teeth reduced to a horizontal surface these processes appear in section as a group of sinuous folds occupying most of the centre of the hinder portion of the tooth, and surrounded on the outer side by a long crescentic band of dentine. Diameters 12·7 × 11.1.

Molars.—(Pl. xv. fig. 9). The edge of the anterior talon is on the inner side double. From the inner side of both links low vertical folds descend to the valleys. Two or three strong vertical folds project from each face of the inner half of the fore lobe, a single fold from the anterior face of the hind lobe; a strong tapering fold rises upon the centre of the posterior surface of that lobe. The links are lofty and sharp.

Maxillary.—$P.^4$ (Pl. xv. fig. 6). Extracted from its crypt in a forward stage of growth is irregular oblong, with convex angles, diameters 11·9 × 9·0. Outer side nearly straight, inner with a deep impression at its anterior two-fifths. Fore end sloping, with oblique folds. Intero-posterior region of crown much dilated, its surface depressed, concave; its edges at each end rising upon the side of the main lobe, and its posterior surface separated from that of the lobe by a wide cleft which does not descend to the base. The concavity of the ledge is traversed longitudinally by a single sinuous ridge-like fold. On the hinder half of the outer side of the crown tapering ridges ascend to the crest.

$P.^3$ (Pl. xv. fig. 5) much mutilated and worn down to a field of dentine surrounding a patch of enamel, on the surface of which sinuous enamel folds still appear in section. The inner side of the crown is impressed at its anterior fourth. Diameters 8·5 × 8·5.

Rise and fall of teeth.

On this point the limited number of specimens afford sparse information. In the upper jaw the penultimate molar appears to assume its full functions with the change of the premolars. In the lower the permanent premolar wears down rapidly during the earlier part of its career; all its asperities have disappeared before the hind lobe of m.^{4} is affected by use. Masticatory work is afterwards done principally by the posterior grinders, as the premolar is but little more reduced in height, though the last molar is that of an aged individual.

Examples—twenty-two.

Mandibular.—The associated rami of a mandible with all the cheek-teeth perfect, the incisiors and left ascending process wanting; adult—An adult left ramus with all the cheek-teeth perfect, vascular orifice minute—Alveolar region of a left ramus with all the cheek-teeth, several of them imperfect; aged—Two right rami with all the cheek-teeth perfect; foramen small; adolescent—Cast of a right ramus with all the cheek-teeth but p.^{4}, some imperfect; vascular orifice moderate; adult—A left ramus with all the molars and the fangs of the premolar; foramen small; adult—A left ramus with the first three molars well preserved; foramen small; adult—A right ramus with part of the ascending process and the last three molars; foramen large; aged—Cast of a portion of a left ramus with m.^{3}, m^4 well preserved; the originals of this and 10223 being in the Australian Museum—Alveolar portion of a right ramus with the first three molars and fangs of the premolar; foramen small; adult—Fragment of a right ramus with the last two molars and the premolar well preserved; adult—Fragment of a left ramus with part of m.^{4}; adult—Fragment of a right ramus with m.^{4} (10518); adult—An isolated tooth m.^{2} (11118); adult—Outer wall of hinder half of a left ramus (A. 9454).

Maxillary.—A left maxilla with the jugal process and the teeth m.^{3}, m.^{2}, m.^{1} (part) and fangs of p.^{4}; no trace of palatal process (10224); adult—A left maxilla with jugal process and the teeth m.^{2}, m.^{3}; no palatal process (10529); adult—Part of a right maxilla with the last three molars; no palatal process (10595);

adult—A right maxilla with jugal process and teeth p.^{3}, mp.^{4}, m.^{1}, m.^{2}; p.^{4} (extracted); palatal vacuity commencing at mp.^{4} (11120); young.

STHENURUS OTUEL, Owen.

Procoptodon otuel, Owen, I. 1874, p. 784; Lydekker, IV. p. 236.
Procoptodon pusio, Owen, *partim*; Owen, II. p. 455.
Pachysiagon otuel, Owen, I. 1874, p. 784.

Lower molars with numerous attenuated ridges on the posterior surface; otherwise not differing from those of *S. goliah* in structure, but inferior in size. Lower premolar elongate-ovate with one or two oblique folds within the cleft.

Dimensions.

Mandibular.—The length of the full series of cheek-teeth varies from 65·5 to 76·0 (5); m.^{2}, m.^{3}, m.^{4} measure 51·0 (bis); m.^{1}, m.^{2} 34·2; mp.^{4} 13·4. The premolar is from 9·3 to 9·9 (2). The width of m.^{3} ranges from 12·0 to 14·4. The anterior depth of the mandible is from 38·5 to 41·5 (2); its thickness from 28·6 to 32·5 (5). The diastema is 36·6 (1), the symphysis 65·6 (1).

The differences between the mean dimensions in this species and *S. goliah* afford in themselves no good reason for keeping them apart; they are all easily paralleled in modern species; but the difference between the greatest width of the teeth in *S. goliah* and the least in *S. otuel* is much greater than in any recent Macropod, and on this dimensional ground the present species would safely rest were the structural modifications exhibited by it less weighty than they are.

Form.

Mandibular.—In the molars the longitudinal links and vertical processes subsidiary to them do not specifically differ in number or disposition from those of *S. goliah*; the slender ridges wrinkling the hinder surfaces sometimes tend to fuse towards the middle of the base into a short rib.

The lower premolar (Pl. XVI. fig. 1) before eruption simulates remarkably well the ledged upper tooth in several Macropods. The intero-posterior ledge-like cusp occupying half of the outer side is separated from the lobe posteriorly by a wide cleft, but within which a larger and a smaller oblique fold ascend on the inner side of the cusp; anteriorly the cusp joins the lobe by the incurving of its sharp edge, and anterior to this transverse sepiment are two cavities separated by a deep rib which ascending to the crest meets a corresponding one on the inner side of the crown, and with it forms a pronounced denticle on the crest. In the worn tooth (Pl. XVI. fig. 4) the structure is still recognisable.

Examples—eleven.

Mandibular.—An adolescent right ramus with all the cheek-teeth and with the incisor nearly entire (11126); accessory processes well marked—A right ramus with all the cheek-teeth but p.^{4} perfect (11119); remains of the accessory processes distinct; aged—The associated rami of an aging mandible (8876), with the greater part of the ascending limbs; accessory processes as before—Portion of a right ramus with the last three molars (8873), adolescent—Alveolar portion of a right ramus with all the teeth mutilated but m.^{1}, m.^{2} (10409); processes nearly obsolete from wear; aged—Portion of a right ramus with the last three molars (10597); processes very distinct; adult—An adolescent right ramus with incisor and all the cheek-teeth but m.^{4}, which has been broken off (11132); processes as before—A right ramus from a suckler with mp.^{4} and m.^{2} in its crypt; the exposed socket of the incisor showing that it was procumbent (10226); the processes on mp.^{4} well marked—Fragment of a left ramus with m.^{2}, m.^{1}, and part of m.^{4} (10596); processes as before; young—Both rami of an aged example all the teeth absent but the last three molars of the left side (11306).

STHENURUS PALES, n.s.

Longitudinal links reduced to a tumescence on the floor of the mid valley and adjacent base of the fore lobe. Posterior basal rim forming a rather distinct talon with a rudimentary link rising upon the lobe. Incumbent folds on the face of the lobes well marked. Ledge of upper premolar distinct and continuous fore and aft, a subsidiary cusp on the hinder end of the outer side of the crown. Size large, about equal to that of *S. goliah.*

Dimensions.

Mandibular.—The first three true molars are together 56·0 in length; the premolar 18·0. The width of m.^{3} is 18·0. The thickness of the mandible is not less than 27·5.

Maxillary.—The premolar is 21·0 x 14·1 in one example; 19·6 x 15·0 in other.

Form of teeth.

Mandibular.—P.^{4} (Pl. xv. fig. 3). Elongate-ovate, diameters 18·0 x 8·2, structurally similar to that of *S. goliah*, but differing from it in form and size, and in the latter character agreeing with the upper premolar (10214 the type of the species). On the inner surface of the crown of this tooth are six distinct ribs, five of which form denticulations on the crest; these are not present in *S. goliah.*

Molars.—(Pl. xv. fig. 1). The lobes of the molars are remarkably thin and flat or even a little concave on the posterior surface their crests perfectly straight and their angles sharp. The incumbent folds are much the more numerous on the anterior lobes, the outermost of them being the largest and forming by its repetition a regular series in the line of the teeth. The hinder surfaces of the lobes are faintly sculptured into numerous obscure folds. In size the molars agree with those of *S. goliah.*

Maxillary.—P^4 (Pl. xv. fig. 2). Elongate-ovate with the angles rounded and tumid; diameters 22·0 x 15·0. Crest central; mesial region of outer side of crown with a few vertical ribs. Inner side of crown a rectangular ledge from end to end connected with the lobe by numerous transverse ribs. To the end of the outer side of the crown is attached, as in the deciduous tooth of

M. giganteus, a distinct cusp separated from the lobe before and behind by clefts, but connected with it by an apical link.

Examples—four.

Mandibular.—The alveolar longitudinal moiety of a right ramus with the first three molars, of which each is somewhat imperfect, and the core of the premolar (8868); the vascular foramen is well marked; the portion of the socket of the incisor preserved is directed upwards at an angle of about 45°—A left premolar (10216); unworn.

Maxillary.—A left premolar (10214), unworn—A second example (10215); shorter and subtriangular rather than ovate, a little worn but well characterised.

STHENURUS OREAS, n.s.

Longitudinal links of lower molars low but distinct, continuous with the outermost of the incumbent folds which are fewer than, but as broad as, in *S. pales*; posterior basal rim bulging but not forming a talon. *Mandible* thick, symphysis anchylosed, incisor highly inclined, posterior dental orifice level with the teeth. *Upper molars* with rudimentary mid links continuous with the innermost and largest of the incumbent folds which resemble those of the lower teeth but are on each face of the lobes; outer mid valley closed by a marginal fold proceeding from the outer end of each lobe (Pl. XVI. fig. 8). Upper premolar very like that of *S. pales*, but wants the subsidiary cusp.

Dimensions.

Mandibular.—The full series of cheek-teeth is 62·2 in length (1); the entire molar series 58·0 (1); the first three molars 41·5 (1); m.^{3} 14·6 (1); the premolar 11·9 (2). The width of m.^{3} is from 12·1 to 13·2 (4). The anterior depth of the mandible is 34·2, the posterior 35·5, the thickness from 22·5 to 25·8 (2).

Maxillary.—The first three cheek-teeth measure 42·0; the first three true molars 40·2 in length; m.^{2}, m.^{3} from 27·2 to 27·6;

m^3, $m.^4$ 30·6; and $m.^5$ 15·5. The width of $m.^5$ is from 12·3 to 13·9 (5).

In dimensions of length this species does not much exceed *S. atlas*, but the thickness of the mandible due to its external convexity, which commences at the incisive outlet, combines with its symphysial anchylosis and the erection of its incisor to connect it with the larger species.

In dental sculpture it is also scarcely to be distinguished from *S. atlas*; yet here again affinity with *S. goliah* and *otuel* is shown by the incumbent fold which represents the anterior link sending a lateral process outwards and downwards.

Examples—nine.

Mandibular.—Associated rami of an adult mandible with all the cheek-teeth (11204); vascular foramen large; type—A left ramus with all the molars, tooth-sculpture not so well marked as in the preceding (8841); adult—Portion of a left ramus with the teeth $m.^1$, $m.^2$, $m.^3$; adult; tooth-sculpture much abraded; vascular foramen large (8830)—Portion of a right ramus with $m.^3$ and part of $m.^2$; adolescent (8842); tooth-sculpture very distinct; vascular foramen large.

Maxillary.—Portion of a right maxilla with the first three molars; tooth-sculpture well marked (10262)—Portion of a left maxilla with $m.^3$, $m.^4$ (8055); adult; sculpture abraded—Portion of a right maxilla with $m.^2$, $m.^3$ (8046); sculpture almost obliterated—Fragment of a right maxilla with $m.^3$ (8069); adult; sculpture distinct—Portion of a left maxilla with the premolar and $m.^1$, $m.^2$ all in fine condition, and exactly fitting the mandible 11204.

STHENURUS ATLAS, Owen; Owen, **XXII.** ii. p. 359.

Macropus atlas, Owen (*l.c.*).

Protemnodon anak, Owen, *partim*; Owen, **I.** 1874, p. 275.

Dental sculpture nearly as in the preceding species, but the linking fold less distinct in the mid valley. Mandible thin, flat exteriorly, increasing in depth posteriorly. Lower contour line straight or arched upwards. Incisor proclivous, spatulate. Symphysis lax.

Dimensions.

Mandibular.—The full series of cheek-teeth is from 55·8 to 58·6 in length (2); the first three molars 30·1 to 31·6 (2); the premolar 12·1 × 6·8 to 12·8 × 7 (2). The width of m.[3] is from 8·9 to 10·5. The anterior depth is from 26·1 to 28·5 (4); the posterior from 29·0 to 32·7 (4); the thickness from 14·8 to 15·6 (4).

Form.

Mandibular.—P.[3] (Pl. xvi. fig. 9). This tooth as exemplified by the anterior two-thirds of its crown in a mandibular fragment is structurally similar to its successor p.[4], but the extero-posterior complicated region of the crown is not evidently marked off by an oblique cleft. On the outer surface of this region there is a distinct trace of an outstanding cusp corresponding to that in p.[4] of *S. pales*.

Molars.—Mr. Lydekker's statement that in *Sthenurus* there are no "vertical folds" must be understood to refer only to the lateral processes of the longitudinal links, as the latter exist in *S. goliah* and *S. otuel*. Of the presence in the type of the genus of tapering folds lying upon the anterior surface of the lobes as we have seen them in all the species now referred to it there is no doubt; there is indeed evidence of the fact in the figure of m.[3] in II. Pl. 82, fig. 9, though no mention of it is made by Owen. In the mutilated tooth now figured (Pl. xvi. fig. 11) from a mandible having the characteristic premolar rising into place the incumbent folds are well marked fully in the hind lobe and by their bases in the broken fore lobe.*

* Complication of structure is more frequently found in the anterior molars than in the posterior; nay, even the fore lobe of the last molar rather than in the hind. It is therefore unsafe to pronounce teeth free from folds unless the young jaw is found without them, or to neglect the slightest trace of such folds which may remain in worn teeth.

Examples—five.

Mandibular.—A left ramus with all the cheek-teeth in place; incumbent folds on m.^{4} distinct, on the other teeth almost obliterated by old age (10607); vascular foramen large—A left ramus with all the cheek-teeth (10726); distinct relics of the folds on the posterior molars; vascular orifice large; aging—A right ramus with the first three molars, sockets of p.^{4} and m.^{4}; folds distinct on all the teeth (8831); vascular orifice large; adolescent —A left ramus with all the cheek-teeth but the last; the rising premolar exposed (10233); vascular orifice moderate; young—A fragment of a left ramus with the anterior portion of the milk premolar.

Key to fossil Halmaturi.

Width of $\overline{\mathrm{m.}}^3$ 7·6 and upwards.

$\overline{\mathrm{P.}}^4$ with a large intero-posterior dilatation; lobes with folds .... *vinceus*

P.^{4} with no large intero-posterior dilatation

Crown of p.^{4} with an anterior lobe partially divided off.. *thor*

Crown of p.^{4} without anterior lobe partially divided off

Size larger; length of m.^{1}, m.^{2}, m.^{3} 32·0 or upwards.. *anak*

Size smaller; length of m.^{1}, m.^{2}, m.^{3} 23·5

Intero-anterior surfaces of lobes smooth...... *dryas*

Intero-anterior surfaces of lobes with accessory processes.............................. *odin*

Width of $\overline{\mathrm{m.}}^3$ 6·5 or less.

P.^{4} with a large intero-posterior cusp; crests of molars straight .... *indra*

P.^{4} with a smaller intero-posterior cusp; fore valley of anterior molars with an accessory link.. *siva*

P.[4] with no large intero-posterior cusp.

Molar crests rectilinear, with sharp angles and feeble links .... *vishnu*

Molar crests curvilinear, with rounded angles and strong links.. *cooperi*

N.B.—As the lower jaw of *H. minor*, Ow., is unknown, its place in the above scheme remains to be ascertained.

Halmaturus vinceus, n.s.

Upper molars with a group of tapering folds in relief on the extero-posterior face of each lobe, with the fore link nearly or quite obsolete and the mid link feeble. Lower molars with a vertical plate and folds in relief on the intero-anterior face of the lobes and with a posterior basal protuberance which is sometimes a distinct talon. Upper premolar broadly ledged posteriorly, narrowly in front. Lower premolar cuneiform in front much dilated intero-posteriorly, J-shaped.

Dimensions.

Mandibular.—In adults the entire series of cheek-teeth ranges in length from 58 to 64·1 (5); the first four 45·3 (1); the first three from 29·5 to 31·8; the first two 20·6 (1). The premolar from 11·0 to 15·6 (8); the last four molars from 48·5 to 49·4 (3); the last three from 34·0 to 38·0 (3); the last two from 25·5 to 29·8 (3); m.[4] from 13·1 to 14·5 (2); m.[1], m.[2], m.[3] from 26·2 to 34·0 (3); m.[1], m.[2] 23·2 (1); m.[1] from 10·7 to 11·2 (2); m.[2] from 12·4 to 13·1 (3); m.[2], m.[3] from 23·7 to 25·6. The width of m.[3] is from 9·8 to 13·0 (31).

In young, p.[3], m.[1], m.[2], m.[3] measure from 38·0 to 42·0; mp.[4], m.[1], m.[2] from 32·5 to 33·0; m.[3] from 13·0 to 15·5 (5).

The anterior depth of the mandible varies from 22·5 to 32·6 (13); the posterior from 21·0 to 32·4 (17); the thickness from 15·1 to 25·0 (23).

Maxillary.—The length of the full series of cheek-teeth is from 60·0 to 64·2 (3); of the first three 37·5 (1); of the true molars 47·5 (1); of the last three molars from 31·9 to 37·0.

Though the lower teeth are in proportion to the upper unusually broad, being scarcely a tenth narrower, the presence of similar accessory processes on corresponding parts of the masticatory surfaces assures us that in this instance molars of the upper and lower jaws are correctly referred one to the other.

Form.

Maxillary.—P.^{4} in the maiden state unknown. The worn tooth (Pl. XVI. fig. 12) is irregularly subtriangular, attenuated at the fore end, its ledge much dilated posteriorly, but narrow at its anterior junction with the lobe, and without traces of transverse ridges. Crest subcentral in front, over exterior fourth behind. Mesial three-fifths of outer surface impressed, deeply at its posterior end: impressed surface with about four low vertical ribs; inner surface with traces of numerous narrow vertical ribs. On the intero-posterior angle remains of a cusp. Diameters 14·7 : 7·6; 13·4 : 7·6. The tooth is equal in length to m.^{4}.

P.^{3} unknown.

Molars.—(Pl. XVI. fig. 14). With one or more short broad flame-like folds on the posterior face of each lobe within the hollow triangle contained by the descending edges of the lobe; not infrequently the folds become plates which running together enclose the lower part of the inner half of the triangular space. The hind lobe of m.^{4} has no distinct processes. Traces of the folds are persistent in well worn teeth with varying distinctness.

Mandibulary.—P.^{4} (Pl. XVI. fig. 13) elongate, narrow anteriorly, suddenly widening posteriorly; mesial diameters 11·5 x 4·3; 11·0 x 4·0; 11·1 x 5.4. Crest central, posteriorly curving downwards to the intero-posterior angle. Outer side of crown straight or slightly convex, with a more or less distinct mesial impression bearing about three vertical ribs; inner side conchoidal posteriorly with three strong ribs; anterior cusp more or less expanded and well defined.

P.^{3} is irregular, subelongate, tapering slowly to a pointed fore end. Crest on the inner side anteriorly, on the outer posteriorly, where it makes an open curve to the apex of a large intero-posterior cusp; outer surface of crown with a short impression faintly marking the limit of an anterior cusp; inner surface concave longitudinally, with two or three moderately strong ribs; in one example a deep depression between the extero-posterior angle of the lobe and its crest demarcating a sort of basal talon. Diameters 8·4 : 4·0.

Molars.—(Pl. XVI. fig. 15). At the point in which each obliquely descending revolute edge of a lobe becomes a longitudinal link there are one or two more or less compressed processes rising within the inner side of the link; these either ascend upon the face of the lobe or stand out from it, and sometimes by confluence and extension upward and inward simulate on that side the oblique edge of the other side. These or traces of them are constant whenever the tooth is not too far gone in wear. The posterior talonal protuberance is also constant and occasionally rises obliquely on to the base of the inner side of the tooth.

Rise and fall of teeth.

No precise information as to the relative periods of change of teeth can be gathered from the examples at present available for study.

Examples—seventy-six.

Mandibular.—Of adults: Five rami with the full series of cheek-teeth—Thirty-five rami or portions thereof with teeth in greater or less number. Of young: Four rami with p.^{3} and three following teeth—Eight without the deciduous premolar.

Maxillary.—Three maxillæ with all the cheek-teeth—One with all the true molars—Five with sundry teeth and a young maxilla with mp.^{4}, m.$^{\bar{1}}$, m.^{2}. Of fourteen supplementary—all are clearly identifiable by the characters peculiar to the species.

HALMATURUS THOR, n.s.

Molars with crests subrectilinear, lobes moderately thick, angles rather rounded and links feeble.

Lower premolar elongate, bicuspidate, without intero-posterior cusp. Molars smooth or with accessory plates, without posterior groove or basal talon. Lower contour line of mandible a gentle curve throughout.

Dimensions.

Mandibular.—The full series of true molars is 39·0 in length when aged (1); the first four cheek-teeth measure 38·0 (1); the first three 28·6 (1); the last three 30·5 (1); the last two 22·5 and 23·5 (2). The premolar 7·5 and 8·0 (2). The width of m.[3] is from 7'7 to 8·4 (6). The anterior depth is from 20·2 to 23·5 (4); the posterior from 18·4 to 22·0 (5); the thickness from 10·1 (aged) to 14·1 (5). The external length is 92·0; the internal 72·0.

Though the thickness of the mandible has the same range as in *H. agilis*, which of modern wallabies has the stoutest underjaw, its length and depth are comparable with those of the kangaroos only. This is also the case with the length of the cheek-teeth, which may be estimated at 50·0 in young adults, and with the width of the molars, but from the kangaroos it is at once distinguished by the structure both of premolar and molars.

Form.

Mandibular.—P.[4] (Pl. XVII. fig. 1) elongate, narrow, diameters 8·0 x 3·4, bicuspid; crest a little to the inner side, deeply notched at its anterior two-fifths. Anterior cusp a well defined strongly compressed cone separated from the longer posterior part of the lobe by a deep gooove descending upon each side of the crown nearly to the base and by the notch in the crest; a slight incrassation of the crown over the intero-posterior angle does not affect the general parallelism of the sides. Equal in length to m.[1].

Molars.—(Pl. XVII. fig. 2). These show a tendency to develop a single erect compressed process at the bottom of the inner mid valley—*i.e.*, a rudiment of an accessory link similar to that in the upper teeth of *Palorchestes* and *M. pan (infra)*. This process occurs in two examples.

Rise and fall of teeth.

The permanent premolar has risen to the crowns of its predecessors as the fore lobe of m.^{4} has pierced the gum, the hind lobe of m.^{3}, having then its edge bevelled off by wear; but it may be also fully in place and distinctly worn at an earlier period, in which the hind lobe of m.^{3} is almost untouched by wear. It remains in function at least till the last molar is well worn down.

Examples—nine.

Mandibular.—An adolescent right ramus with the first four cheek-teeth—An aged left ramus with base of incisor and the posterior true molars—An adult right ramus with all the true molars, m.^{1} worn to the base—An adult right ramus with the last three molars in fine preservation—An adolescent right ramus with the last two molars well preserved—A right adolescent ramus with the first three true molars and p.^{4} exposed from above in its crypt, and fragments of a right adolescent ramus with the first three cheek-teeth.

The species is well characterised by the form of its premolar in conjunction with a size superior to that of modern wallabies.

HALMATURUS ANAK, Owen, VI. Vol. xv. p. 185, 1859

Protemnodon anak, Owen, *partim*, I. 1874, p. 275.

P. og, Owen, I. 1874, p. 377.

P. ræchus, Owen, I. 1874, p. 281.

P. mimas, Owen, I. 1874, p. 278.

P. antæus, Owen, I. II. p. 448.

Sthenurus atlas, Owen, *partim*, I. 1874, p. 265.

S. brehus, Owen, I. 1874, p. 272.

Macropus mimas, Flower, IX. pt. 2, p. 720.

M. brehus, Lydekker, IV. p. 207.

M. ræchus, Owen, I. 1874, p. 281; Lydekker, IV. p. 212.

M. anak, Lydekker, IV. 214.

Molars smooth, with rectilinear crests, feeble links and sharp angles; upper molars without distinct anterior links, lower seldom without posterior talons. Premolars about as long as the lower last molar. Upper premolar with a long transversely ribbed ledge; lower without intero-posterior cusp.

Dimensions.

Mandibular.—In adults : The length of the full series of cheek-teeth ranges from 60·2 to 82·3 (34); of the first four from 48·2 to 60·0 (16); of the first three from 32·1 to 41·2 (10); of the first two from 22·2 to 27·4 (7); of the premolar from 14·0 to 18·2 (74); of the last four molars from 48·2 to 56·0 (11); of the last three from 40·3 to 53·0 (16); of the last two from 26·5 to 33·7 (19); of m.^{4} from 14·5 to 19·0 (9); of m.^{1}, m.^{2}, m.^{3} from 37·0 to 45·6 (7); of m.^{1}, m.^{2} from 21·5 to 28·6 (16); of m.^{2}. m.^{3} from 25·4 to 31·0 (14); of m.^{1} from 9·2 to 13·3 (9); of m.^{2} from 12·5 to 18·3 (11); of m.^{3} from 12·2 to 15·0 (5).

In young: The length of p.^{3}, mp.^{4}, m.^{1}, m.^{2}, m.^{3} is from 54·1 to 62·2 (3); of p.^{3}, mp.^{4}, m.^{1}, m.^{2} from 42·0 to 51·0 (7); of p.^{3}, mp.^{4}, m.^{1} from 28·4 to 32·8 (5); of p.^{3}, mp.^{4} from 18·0 to 20·9 (7); of p.^{3} from 8·5 to 11·2 (23); of mp.^{4}, m.^{1}, m.^{2}, m.^{3} 57·8 (1); of mp.^{4}, m.^{1}, m.^{2} from 33·6 to 35·2 (4); of mp.^{4}, m.^{1} from 20·0 to 23·5 (10); of mp.^{4} 10·2 (1).

The width of m.^{3} in adults is from 10·0 to 13·6 (118). The anterior depth of the mandible is from 22·0 to 45·0 (82); of the posterior from 18·0 to 40·4 (72); the thickness from 13·6 to 23·5 (89); the external length is from 100·0 to 155 0 (13); the internal from 67·5 to 113·5 (11); the symphysis from 32·5 to 57·0 (15); the diastema from 31·1 to 57·0 (15).

Maxillary.—In adults: The length of the entire series of cheek-teeth is from 65·1 to 85·5 (17); of the first four 66·5 (1); of the first three from 38·5 to 45·5; of the first two from 24·6 to 27·1 (3); of the premolar from 14·4 to 20·4 (33); of the last four molars from 50·5 to 67·5 (8); of the last three from 40·0 to 51·5 (12); of the last two from 30·1 to 37·0 (9); of the first three true molars from 33·1 to 39·9 (5); of the first two from 21·5 to 27·4 (7); of m.^{2}, m.^{3} from 28·0 to 34·1 (11); of m.^{2} 17 (1); of m.^{3} from 17·0 to 18·4 (6); and of m.^{4} 16·6 (1). The breadth of the palate is from 66·0 to 68·5 (2).

In young: p.^{3}, mp.^{4}, m.^{1} range from 28·6 to 37·0 (3); mp.^{4}, m.^{1}, m.^{2} 41·7 to 44·4.

The proportionate mean widths of m.^{3} above and below are 11·8 and 13·6.

The degree of variation in the length of the cheek-teeth found in this species is less than that shown by *H. ruficollis;* and the premolar has a more restricted range of length than in most of the larger existing wallabies. On the other hand, the width of the teeth and the depth of the mandible have a somewhat greater range of measurement than in living species, and in thickness the ramus is decidedly more variable. But as in all the dimensions, the extremes are reached by insensible gradations, excess even in the width of the teeth must be considered a peculiarity of the species and one probably related to its inordinate vigour as shewn in its fecundity. It is quite the most abundant Macropod of its period.

As no one of the several species added by Owen to the type of his genus *Protemnodon* has a destinctive character other than a supposed differentiation in size, Lydekker has taken a step in the right direction in reducing their number to three—*brehus*, *ræchus* and *anak*. With a fuller supply of material he would no doubt have felt perfectly safe in referring all the fossils of the Protemnodont series to the single species *anak*. The essential unity of the species is shown not merely by graduation of difference affecting each part of each of three hundred and thirty individuals alike, but by that disproportionate difference between the parts which renders it impossible to lay down interspecific lines of demarcation anywhere. Detailed measurements of thirty-four entire mandibles of *brehus*, *ræchus* and *anak*, and a careful comparison of their differences with those observed in the measurement of recent species fail to show that there is any sufficient reason for regarding them as distinct species. Constant differences of form there are none.

Form.

Mandibular.—P.[4] (Pl. XVII. fig. 6) as it appears in a worn condition is elongate with mesial diameters 178 : 56, oblong tectiform, obtusely pointed in front and not dilated posteriorly. Crest central, nearly level, obtusely serrated. The mesial two-thirds of the crown compressed, but more deeply on the outer side, the surface of which has corrugations with much fainter ribs in the intervals; the inner surface similarly corrugated. Anterior cusp distinctly defined by the mesial compression, its point low and obtuse. Over the intero-posterior angle the crown is more tumid than over the outer angle.

The tooth varies much in proportions and other respects. The diameters may become 161 : 72 and the intero-posterior part of the crown so tumid as to cause the inner surface of the crown to be concave longitudinally, the tooth being then distinctly broader at its hinder end. The number, strength and disposition of the corrugations are all subject to variation, and frequently under stress of wear disappear altogether.

P.[3] (Pl. XVII. fig. 5) in its maiden state is irregularly oblong, with mesial diameters 103 : 51; its basal contour is arched on the outer side, nearly straight on the inner, its fore end obtusely pointed. Crest with five low obtuse cusps, subcentral, curving on to the intero-posterior angle, which is sufficiently tumid to render the crown vertically concave on that side. Crown compressed, with three ribs on the outer and two on tbe inner side, the outer ribs graduated in length posteriorly. Anterior cusp moderately distinct.

This tooth also varies in shape, proportions and corrugation. The intero-posterior angle may dilate sufficiently to render the general form subtriangular, the mesial diameters may vary to 106 : 66, 89 : 86, the ribs may be fewer in number or become indefinite. Under wear the ribs quickly vanish.

Molars.—(Pl. XVII. fig. 9). The longitudinal linking ridges are weak, the lobes but lightly convex posteriorly. Posterior basal talons are generally present as erect plates, raised rims or a mere, but decided, bulging of the base. The hind lobe of m^4 is in the mean of ten examples narrower than the fore lobe in the ratio 11 : 12.

The contour of the mandible forward of the hinder molars is nearly straight. The upward curve beneath the anterior molars, always faint, is occasionally reversed and a continuous curve produced from the inflected angle to the symphysis.

Maxillary.—$P.^4$ (Pl. XVII. fig. 8). In a tooth recently come into position the general form is an isosceles triangle with the inner side irregular and the angles rounded. Diameters 191 : 100. crest subcentral, parallel with the outer side of the base. Mesial two-fifths of the outer side of the crown deeply impressed, with three strong vertical folds rising to the crest. Ledge occupying mesial two-thirds of the inner side of the crown, with a raised basal rim commencing at the hinder end of the anterior cusp; within the rim the ledge is deeply concave and is traversed by four ribs ascending on the lobe to the crest. Intero-posterior cusp wide, joined to the side of the lobe; behind it to the outer side a deep transversely elongate pit, which is enclosed behind by the posterior surface of the lobe.

By contraction of the intero-posterior cusp the form may become regularly oblong, the tooth being then scarcely broader behind and its diameter 178 : 75, or the like form may result from a dilatation of the fore end of the basal rim to an equality with the extent of the intero-posterior angle; the tooth in this case may present a gibbosity near the fore end of the inner side. The ribs of the outer side of the crown may be reduced to two in number. The basal rim of the inner side is generally broken up into from two to five tubercles, usually one at the base of each vertical rib.

$P.^3$ (Pl. XVII. fig. 7) in a fresh condition is irregularly sub-triangular, with the fore end rounded. Mesial diameter 133 : 77. Crest well to the outer side of the central line, parallel with the outer side of the base. Mesial half of the outer side of the crown impressed, with two strong vertical folds. Ledge as in $p.^4$ but gradually dilating as it nears the intero-posterior cusp, which is wide, joined by a rib to the lobe and separated from it posteriorly by a deep excavation. In a much worn tooth the basal rim may be almost entire and the diameters 125 : 76.

Molars.—(Pl. XVII. fig. 10). Fore link obsolete or nearly so, and mid link weak; lobes but slightly convex anteriorly. The base of the posterior concavity of m.^{4} is enclosed by the descending inner edge; an adpressed fold is therefore seen on the hinder surface of the anterior molars. The difference between the widths of the lobes of m.^{4} is greater than in the lower tooth; their ratio is 13·5 to 12·5.

Examples—three hundred and twenty-nine.

Mandibular.—Of adults: Thirty-four rami with all the cheek-teeth, most of them with the incisor in place—One hundred and fifty-three rami or parts thereof with fewer than all the cheek-teeth.

Of young: Twenty-four rami with p.^{3} and some of the following teeth—Sixteen rami without p.^{3}.

Maxillary.—Of adults: Seventeen maxillæ with all the cheek-teeth, five of them being each a part of a cranium more or less entire—Seventy-six maxillæ or parts thereof with teeth in greater or less number.

Of young: Nine maxillæ with various teeth.

HALMATURUS DRYAS, n.s.

Molars with the upper fore link well developed. Upper premolar with a narrow ledge tubercular, but not transversely ribbed. Lower premolars, both permanent and deciduous, like those of *H. anak.* Size inferior.

Dimensions.

Type maxillary.

Maxillary.—In adults: The length of the entire series of cheek-teeth is 54·9 (1); of the first four 46·2 (1); of the true molar series 47·5 (1); of the first three 29·6 (1); of the premolar from 11·5 to 15·0 (3). The width of m.^{3} is from 9·9 to 10·3 (5).

Mandibular.—In adults: The full series of cheek-teeth ranges from 52·7 to 58·5 (3); the first four are 35·5 (1); the first three vary from 28·3 to 29·1 (3); the first two are 19·5 (1); the premolar measures from 10·0 to 13·0 (8). The true molar series ranges from 40·0 to 48·1 (8); the last three from 34·3 to 41·1 (9); the last two from 23·8 to 28·6 (12); the first three from 29·4 to 38·1 (5); the first two from 20·5 to 22·6 (4); m.^{2}, m.^{3} are 27·1 (1); m.^{3} 13·0 (1); m.^{4} is from 13·2 to 14·4 (7). The width of m.^{3} is from 8·0 to 10·5 (37). The anterior depth of the mandible varies from 22·0 to 30·0 (20); the posterior from 19·4 to 29·9 (21); the thickness from 12·7 to 18·8 (31).

It will be apparent from these measurements that though their maxima overlap in some cases the minima of *H. anak* the differences between their minima and the maxima of the other are far too great to be ascribed to the elasticity of a single species even were all the teeth indistinguishable. The existence of a dwarfed variety of *H. anak* conterminous and contemporaneous with it is too unlikely to be worth considering.

The probability that upper and lower jaws are in this case rightly associated rests on the grounds of corresponding size and premolar structure.

Form.

Mandibular.—The premolar p.^{4} (Pl. XVII. fig. 12) as extracted from its chamber in an advanced stage of growth is an elongate-ovate symmetrical tooth with a cuneiform crown and diameters 10·7 : 4·4. The crown is compressed as to its mesial two-thirds, more deeply on the inner side. Three mesial ribs on each side form serrations on the crest which is central. There is no dilatation or tumidity of the intero-posterior angle, but the end of the crest inclines slightly inwards. In the worn state these teeth can be distinguished from old teeth of *H. anak* only by their size.

The deciduous premolar p.^{3} (Pl. XVII. fig. 11) is very similar to that of *H. anak*, convex on the outer, nearly straight on the inner side, with a slightly developed intero-posterior cusp which renders the inner side somewhat concave posteriorly. Diameters 7·0 × 3·9.

Maxillary.—The premolar p.^{4} (Pl. XVII. fig. 13) is elongate-triangular, with diameters 13 × 7·8 (basal). Crest central anteriorly, parallel with outer side and not incurved posteriorly. A largely dilated intero-posterior cusp linked to the lobe apically, separated from it by a wide cleft posteriorly. Ledge very narrow within a broadly tubercular basal rim which extends to the anterior fifth. Mesial two-thirds of the outer side impressed, with three strong short ribs, decreasing in length rearwards.

Molars.—(Pl. XVII. figs. 14-15). Mandibulary, with a narrow basal ridge posteriorly; hind lobe of m.^{4} distinctly the narrower.

Examples—seventy-three.

Maxillary.—Four adults.

Mandibular.—Fifty-six adults, thirteen young.

HALMATURUS ODIN, n.s.

Lower premolar unilobate, mesially corrugated, expanded but not developing a cusp on intero-posterior angle. Molars with an accessory process in relief on intero-anterior surface of lobes and with basal talons. Lower contour line undulated.

Dimensions.

Mandibular.—The full series of cheek-teeth measures 46·7 in length (1); the first four 37·0 (1); the first two true molars 18·6 (1); the last molar 12·4 (1); the premolar from 8·0 to 8·7 (3); m.^{2} 10·8 (1). The width of m.^{3} 7·6 and 8·1 (2). The anterior depth is from 19·2 to 24·1 (3); the posterior from 16·1 to 23·8 (3); the thickness from 11·5 to 12·5 (3).

Form.

Mandibular.—P.^{4} (Pl. XVII. fig. 16) elongate; diameters 8·0 × 4·0, gradually widening from the pointed fore end. Crest central; anterior and posterior cusps defined by a mesial compression of the crown, which has on each side three distinct and two obscure short ribs. Crest curving on to a small but distinct dilatation of the crown over the intero-posterior angle. Profile of fore end of crown gibbous.

Molars.—(Pl. XVII. fig. 17). From the intero-anterior angle of each lobe a low fold descends obliquely to or towards the middle of the anterior base of the lobe, and on the triangular face of the lobe lies a small ascending fold similar to those in *Sthenurus*. Previous knowledge of these folds is required for the recognition of traces of them left in the aging mandible. The basal talon is a distinct ledge-like protuberance.

Examples—six or eight.

An adolescent right ramus with the first four cheek-teeth, the type—A right aging ramus with all the cheek-teeth—$P.^4$ in a fragment of a right adolescent ramus—$M.^4$ in a portion of an aged left ramus—Part of an adult left ramus with $m.^1$, $m.^2$—And a portion of a young left ramus with $m.^2$. To these may be added two maxillary fossils which perchance belong to the species.

HALMATURUS INDRA, n.s.

Molars with crests moderately curved, angles subrotund, and links feeble. The lower permanent premolar subtriangular, with a large intero-posterior cusp; the deciduous short, broad, convex exteriorly. Molars smooth, without posterior groove or distinct talon.

Dimensions.

Mandibular.—Young: $P.^3$, $mp.^4$ $m.^1$ measure 23·1; $p.^3$ 6·4; $p.^4$ immature 7·7.

The long dimension of the teeth is the same as in *H. cooperi*.

Form.

Mandibular.—$P.^4$ (extracted) (Pl. XVII. fig. 19), subtriangular, with a large intero-posterior cusp, separated from the posterior surface of the lobe by a broad vertical groove. Outer surface of crown impressed and bearing a low broad mesial rib; anterior end of crown with a horizontal groove between base and lobe. Crest central, not curving inwards posteriorly.

$P.^3$ (Pl. XVII. fig. 18) short, broad, basal outline biconvex, diameters 6·4 x 4·5. Crest towards the inner and flatter side.

Crown mesially compressed, with a distinct mesial rib on each side. Basal rim on each side tumid, subnodular, especially on outer side, obscurely continuous round fore end.

Molars.—(Pl. XVII. fig. 20). Links high but narrow; on the outer side of the posterior base of m.[1] a rudimentary ledge-like talon.

Sufficiently distinguished by the premolars from all other species recent and extinct.

HALMATURUS SIVA, n.s.

Molars with curved crests, rounded angles and strong links.

Lower premolar unilobate, narrow; intero-posterior dilatation moderate, consisting apparently of two flat folds tapering off above into vertical ribs; anterior cusp small and ill-defined.

Molars smooth, with long anterior talons, and without posterior groove or basal talon. The inner valley of the anterior talon subdivided by an accessory link in the two anterior molars.

Dimensions.

Mandibular.—The full set of adult cheek-teeth is 40·6 in length; the first three molars 24·4 and 24·9; the last three 28·8; the first two 17·2; the premolar 7·1. The width of m.[3] is from 6·2 to 6·4 (4). The anterior depth of the mandible is from 18·0 to 23·0 (4); the posterior from 12·9 to 18·1 (4); the thickness from 11·3 to 12·0 (3).

In general size it agrees with the larger wallabies of the present day.

Form.

P.[4] (Pl. XVII. fig. 21) diameters 7·1 x 2·7; crest over inner edge anteriorly, nearly level, curving inwards posteriorly; anterior cusp scarcely differentiated from the rest of the crown by a slight mesial impression on the inner side; posterior to this the inner side is rendered more concave by two successive folds ending above in sharp plaits.

Molars.—(Pl. XVII. figs. 22-23). The anterior talons are in length nearly a third that of the entire tooth.

Examples—eleven.

A right adult ramus (11181) with all the cheek-teeth but $m.^1$— A second with all the cheek-teeth older, and a third with all the true molars aged—A left adult ramus with the last three molars—Two rami with the anterior three true molars—A fragment of a ramus with $m.^1$, $m.^2$.—A young ramus with the last three molars, and a second with the last two—A maxilla with the last three molars is also referable to this species.

The type, 11181, could in the absence of the premolar be mistaken without any difficulty for a mandible of *H. agilis;* but in addition to the dental differences apparent on comparing it critically with mandibles of *H. agilis* of the same age, we may add that the diastema is much longer, and the anterior dental foramen further forward than in any example of the recent wallaby.

HALMATURUS VISHNU, n.s.

Molars with rectilinear crests, sharp angles and feeble links.

Lower premolar unilobate, cuneiform, coarsely ribbed. Molars smooth. Anterior portion of lower mandibular contour straight.

Dimensions.

Mandibular.—The length of the full series of cheek-teeth is 44·3; the true molars are from 33·4 to 35·6 in length (3); the last three 28·0; the last two 18·6 and 21·9 (2); the first three 23·5; the first two from 15·1 to 17·4 (4); $m.^2$ 9·0; $mp.^4$, $m.^1$, $m.^2$ 17·4 and 23·4 (2); the premolar $p.^4$ 9·2 and 9·6 (2). The width of $m.^3$ is from 6·5 to 7·6 (8). The anterior depth is from 18·0 to 20·0 (4); the posterior from 15·4 to 16·5 (4); its thickness from 10·1 to 12·2 (7); its internal length 58·0.

The length of the dental series is surpassed by that of the kangaroos only, and is approached most nearly by that of *H. agilis* among the wallabies. In this latter species we find a maximum length of 43·5 with a mean of scarcely 40·0. But from *H. agilis* the extinct species is better distinguished by the length of the premolar, 9·2 minimum against a maximum of 8·1 in the living species; by the greater width of the molars, that of m.[3] averaging 7·1 against 6·4 in *H. agilis;* by its much feebler inter-lobular links; and by the straightness of the lower edge of the mandible. The same characters serve to separate it from *H. ualabatus*, which approaches it somewhat more nearly in the length of the premolar, but recedes further from it in the total length of the cheek-teeth. With no other recent species is it comparable as to the dimensions of teeth, though in the depth and thickness of the mandible it is occasionally exceeded by all the larger-sized modern wallabies.

Form.

Mandibular.—P.[4] (Pl. XVII. fig. 3) subelongate, oblong, cuneiform, diameters 9·6 × 4·4, sides parallel, fore end obtusely pointed. Crest a little to the inner side, with obtuse denticulations corresponding to coarse but indistinct corrugations on either side of the mesially compressed crown. A faintly marked nodular basal rim on either side is continuous round the fore end. In a second example with diameters 9·2 × 4·6 the mesial compression of the crown is stronger, and the crest curves slightly over to the intero-posterior angle, rendering the inner side of that end of the crown subconchoidal. Length equal to or rather less than that of m.[4].

Mandible elongate, shallow, nearly straight from the posterior molar forward.

Molars (Pl. XVII. fig. 4) without accessory folds; with or without a rudimentary talon; links narrow and low.

Persistence of teeth.

The permanent premolar though much worn is still in the horizontal line of the molars, and shows no sign of ejection when the last molar has been some time in use; in another instance the roots of the broken tooth are in place, though m.[4] is much worn.

Examples—sixteen.

These consist of two adult mandibular rami with all the cheek-teeth, the premolar of one of them being imperfect; of three with all the true molars; nine with sundry molars, and two young rami with mp.^{4}, m.^{1}, m.^{2}.

Halmaturus cooperi, Ow.

Molars with curved crests, rounded angles and strong links.

Lower premolars elongate, narrow, tumid on intero-posterior angle, but developing there no cusp; crest tridentate. Molars smooth without groove or basal talon posteriorly. Upper premolar ledged, with an intero-posterior cusp; molars smooth with adpressed folds posteriorly. Lower mandibular contour undulatory. Palate entire.

Dimensions.

Mandibular.—The full series of cheek-teeth measures in adults from 38·6 to 42·5 (3); in adolescents from 44·4 to 50·7 (3). The true molars vary from 34·0 to 39·5 (5); m.^{2}, m.^{3}, m.^{4} from 28·5 to 33·6 (9), but in an adolescent tooth reach 35·7; m.^{3}, m.^{4} are from 20·5 to 25·0 (7); m.^{4} from 11·8 to 12·8 (4). The first four cheek-teeth range from 29·3 to 37·0 (15); the first three from 29·3 to 38·4 (4). The premolar varies from 7·0 to 9·6 (6). The width of m.^{3} ranges from 6·5 to 8·5, doubtfully to 9·6 (54). The anterior depth in adults is from 17·5 to 27·3 (17); in adolescents 17·6 to 23·5 (17); the posterior in adults from 17·4 to 26·6 (18); in adolescents from 15·0 to 21·5 (6). The external length is from 65·7 to 78·0 in adults (3). The internal from 53·2 to 66·7 (6); the thickness from 11·4 to 16·2 (23). In the young the first three cheek-teeth are 23·1 and 24·0 (2); mp.^{4}, m.^{1} 16·0; m.^{1} 9·9; m.^{1}, m.^{2}, m.^{3} 26·6 and 29·5; m.^{1}, m.^{2} from 17·0 to 21·6 (4); m.^{2}, m.^{3} from 20·0 to 22·8 (5); m.^{3} from 10·1 to 12·5 (4); p.^{3} 6·8 and 7·7 (2).

Maxillary.—The entire set of cheek-teeth is 50·2; m.^{1}, m.^{2} 23·0; m.^{2}, m.^{3} 23·3; and p.^{4} 10·5. Width of m.^{3} 9·5.

Form.

Mandibular.—P.^{4} (Pl. XVII. fig. 25) irregularly ovate, diameters 8·5 × 3·1; crest subcentral, tridentate. Crown mesially compressed; the compression defining an anterior cusp. Mesial cusp small, formed by the coincidence of a rib in the middle of the compression on either side. Sides nearly parallel; fore end acuminate; intero-posterior angle a little expanded, but not bearing a distinct cusp. About as long as m.^{1}.

P.^{3} (Pl. XVII. fig. 24) diameters 7·4 x 3 7, otherwise differing little from p.^{4}.

Molars.—(Pl. XVII. fig. 26). Subelongate, diameters of m.^{3} 11 2 x 8·0.

Maxillary.—P.^{4} (Pl. XVII. fig. 28) elongate, pointed anteriorly, diameters 10·5 x 5·0. Ledge very narrow, continued to the fore end of the crown; an intero-posterior cusp connected with the lobe apically and separated from it posteriorly by a deep vertical gorge, crest tridentate; outer surface of crown mesially impressed, the impression strongly defining an anterior cusp. Median cusp connected with basal rim of ledge by a vertical rib.

Molars.—(Pl. XVII. fig. 27). Subquadrate; diameters of m.^{3} 11·5 x 9·5; the posterior hollow of m.^{4} nearly closed in at the base by an elevated lip which on anterior teeth forms the adpressed fold.

Rise and fall of teeth.

Mandibular.—The permanent premolar is ejecting its predecessor just before the hind lobe of m.^{3} comes into use; it is retained at least till the hind lobe of m.^{4} is half worn down, and its persistence causes m.^{1} to be thrust out of the line of the teeth or reduced to a mere shell. As Owen observes, this retention of the anterior cheek-teeth is inconsistent with the dental flux of a true Macropus.

Examples—seventy-three.

Mandibular.—Adults thirty-one; adolescents nineteen; young twenty.

Maxillary.—One adult cranium with all the cheek-teeth; two portions of young maxillæ.

This, the most abundant of the species with teeth similar in size and form to those of the type of Owen's *H. cooperi*, is the most likely to have yielded that fossil, and is identified with it on that account alone; if in error, the fault must lie with the describer of an object not susceptible of sufficient description.

HALMATURUS MINOR, OW.

Sthenurus minor, Owen, VII. 1877, p. 353.

Macropus minor, Lydekker, IV. p. 218.

But seven examples of this species have been found; one is a maxilla in the same stage of growth as the type showing p.^{3}, mp.^{4}, m.^{1}, m.^{2}, and p.^{4} exposed in its crypt. The premolars are similar to those figured by Owen. The other examples are an isolated p.^{4}; a young maxilla with m.^{1} m.^{2} m^3 and the premolar ready to emerge; two adult rami with all the true molars and one young ramus with all the cheek-teeth, but with these unfit for description. (Pl. XVIII. figs. 1-2).

HALMATURUS sp.

Molars with rectilinear crests, sharp angles and feeble links. Lower premolar elongate, apparently with an intero-posterior cusp. Molars without posterior grooves or distinct talon.

Dimensions.

Mandibular.—The length of the full series of true molars is 28·7; the premolar between 8·5 and 9·0 (estimated). The width of m.^{3} is 5·8. The anterior depth of the mandible is 17·0; the posterior the same; the thickness 11·6.

The length of the molar series being greater than the extreme length in *H. dorsalis* and all wallabies inferior to it in size, while its width is much less than the least in *H. agilis* and *ualabatus*, and the length of the premolar greatly exceeding that in *H. ruficollis* and *M. parryi*, and even those of *H. agilis* and *ualabatus*, it is clear that this mandible is not referable to any known species.

In the only example extant the premolar is imperfect in length, and both it and the molars have been so long in wear as to destroy any diagnostic features which may have existed in earlier life. It is worse than idle to confer on such a fossil names which cannot with certainty be extended to others.

Halmaturus sp.

A portion of a right mandibular ramus of an aged individual with the last three and major part of the first true molars. The estimated length of the molar series is 34·5; the last three teeth measure 27·1. The width of the series at m.^{3} is 7·1. The mid depth of the mandible is 18·5; its thickness 10·9.

The width of the teeth falls within the range of that in *H. agilis, ualabatus* and *ruficollis*. The depth of the mandible would allow it to be referred either to *agilis* or *ruficollis;* its thickness to either of the large wallabies or to *M. parryi.* But the species is readily distinguished from *H. ualabatus,* to which, among modern kinds, it has the greatest resemblance by the greater length and width of the anterior talon, which forms a much larger portion of the whole than in the recent tooth. In consequence of this amplification of the talon the tooth is elongated; selecting a mandible of *H. ualabatus* of the same age as the fossil, and with teeth of the same width, we find that the length of the series of true molars in the fossil is a tenth greater than in the living species, the talons being on the average a millimetre longer.

Until the premolar is known the species may be left unnamed.

Halmaturus sp.

Molars with rather straight crests, subrotund angles, and moderately strong links; without posterior groove or talon; smooth.

Dimensions.

Mandibular.—The last three cheek-teeth measure 25·1 in length. The width of m.^{3} is 5·9. Posterior depth 14·8; thickness 11·0.

So far as it goes the fossil corresponds in size with *H. dorsalis,* and it is without any distinct marks of differentiation from that species; but as it is equally without characters, apart from dimensions, which demand its identification with *H. dorsalis*, and as dimensions alone are a good servant but a bad master it would be a very rash step to announce on the evidence of this imperfect mandible the geological antiquity of the common scrub wallaby.

HALMATURUS sp.

Molars with curved crests, rounded angles and strong links; smooth. Lower molars with an incipient posterior groove, but no talon.

Dimensions.

Mandibular.—The last two molars are 16·0 in length. The width of m.^{3} 5·4. Thickness 8·7.

These dimensions have no counterpart among known species.

Examples.

A portion of an adult left ramus with m.^{3}, m.^{4}—A portion of a young right maxilla with mp.^{4} (part), m.^{1}, m.^{2} may be provisionally referred to the same species.

HALMATURUS sp.

The anterior portion of a young ramus with m.^{2} and relics of m.^{1}, the molars with rectilinear crests, angular lobes and feeble links, and the length of m.^{2} barely 6·0 is insufficient for determination.

MACROPUS MAGISTER, n.s.

M. titan, Owen, *partim*—Owen, **XXII**. Vol. ii. p. 360; II. Pl. 82, figs. 17-18; Lydekker, **IV**. p. 225; Etheridge, **V**. 183.

The validity of a new name for the paramount species among the kangaroos of the Nototherian Period depends on the proof to be adduced that the fossils referred by Owen to his species, *M. titan*, are by no means identical with it. The name *M. titan* was given by its author to a species represented by a portion of a young mandible with a single perfect tooth, m.^{2} (m.^{1} of **II**. Pl. 82, figs. 17, 18). With such straitened means of recognising the species in other examples it might have been supposed necessary for safe determination that these or some one of them should have the corresponding tooth at least in fair accordance with that of the type tooth as to shape and proportions. According to the "improved figure" of the type tooth (*l.c.*) its diameters are 14·5 and 11; in adult life its length would be still less in proportion to its breadth. But in the adult mandibles identified with it by their describer the diameters of this tooth are respectively 14 and 9·5, 15 and 9, 15·7 and 10, yielding as a mean ratio 14·9 and 9·5; whereas, to maintain the typical proportions of even the young tooth, the respective widths should be 10·6, 11·4 and 12·6, or in the mean 11.5. This difference in proportions is quite obvious to the eye, and so far exceeds the latitude in this respect taken by modern kangaroos as to be entirely prohibitory of the accepted identification. In no one of scores of specimens whose specific co-identity has been ascertained by tracing them through every phase of dentition, and whose identity with the supposed co-types of *M. titan* is beyond question, does the tooth show any tendency to exchange its normal elongate form for the comparatively square shape notable in *M. titan*. The mean ratio of length to breadth deduced from ten adult examples taken at random is 14·5 : 9, and if we take mandibles equal in age with the *M. titan* type the difference is of course still more evident; in the young $m.^2$ the diameters are 14·8 and 8·8. A further proof of non-identity is the absence of a vertical groove from the hinder surface of the tooth in *M. titan*. This groove is present in the mandibles considered co-specific by Owen, and is invariably so in locally preserved examples.

Finally, the form and extent of the anterior talon of *M. titan* are very different from those of *M. magister* at the same age; that of *M. titan* is a semioval with a short minor diameter; that of *M. magister* is much longer, has straight converging sides and a short straight anterior edge. On these grounds Owen's identification of his Queensland examples of *M. titan* with his Wellington Valley type must be disallowed. It was a judgment, be it observed, delivered *ex cathedra* without reason assigned.

Molars smooth, elongate, with curvilinear crests, thick lobes, rounded angles and strong, directly longitudinal links. Base of revolute inner edge of hinder surface of upper molars elevated, forming an adpressed fold on the corresponding part of the anterior teeth; a vertical groove on the hinder surface of the lower molars. Upper premolar bilobate, with a small intero-posterior cusp; lower premolar bilobate, with a large intero-posterior cusp nearly confluent with the hinder lobe.

Dimensions.

Mandibular.—Adults : The entire series of cheek-teeth is 56·6 and 60·8 in length (2); the premolar from 6·4 to 7·6 (3). The series of true molars from 51·8 to 59·3 (8); the last three from 40·0 to 50·5 (33); the last two from 28·1 to 36·5 (39); m.^{4} from 16·2 to 20·0 (26); the first three 35·7 and 38·5 (2); m.^{2}, m.^{3} from 26·1 to 28·5 (3); m.^{2} from 13·7 to 16·7 (5); m.^{3} from 16·1 to 17·6 (8); m.^{1} 15·4 (1). The width of m.^{3} is from 9·0 to 11·6 (91). The anterior depth of the mandible is from 29·6 to 44·0 (60); the posterior from 26·6 to 41 (75); the thickness from 15·6 to 24·0 (76). The external length varies from 127·0 to 142·0 (6); the internal from 80·0 to 98·0 (20); the diastema from 61·0 to 70·0 (5); the symphysis from 56·0 to 69·0 (5).

Adolescents : The first four cheek-teeth are 53·0 (1); the series of true molars 60·0 (1); the first three molars from 40·2 to 48·4 (7); the first two 27·3 (1); m.^{2} is 15·6 (1); m.^{4} 16·2 and 19·0 (2); m.^{2}, m.^{3} from 27·5 to 34·0 (11); m.^{3} from 16·0 to 17·4 (8); m.^{3}, m.^{4} from 29·0 to 35·0 (5); the premolar from 7·2 to 8·6 (3). The width of m.^{3} is from 9·1 to 11·3 (33).

Young : P.^{3}, mp.^{4}, m.^{1} measure from 29·9 to 32·5 (7); mp.^{4}, m.^{1}, m.^{2} from 35·2 to 43·5 (7); mp.^{4}, m.^{1}, m.^{2}, m.^{3} from 45·0 to 50·0 (4); mp.^{4}, m.^{1} from 22·1 to 29·1 (15); m.^{2}, m.^{3} from 28·0 to 31·5 (4); p.^{3}, mp.^{4} from 18·9 to 19·6 (6); mp.^{4} from 10·5 to 11·0 (3); m.^{1} from 10·5 to 13·2 (8); m.^{2} from 13·6 to 14·4 (3); m.^{3} from 15·5 to 16·0 (3); the premolar p.^{3} from 7·1 to 9·0 (16).

Maxillary.—Adults : The full extent of the cheek-teeth is from 62·5 to 65.7 (4); of the true molars from 54·0 to 60·6 (12); of the last three molars from 41·5 to 45·0 (3); of the last two from 31·2 to 34·1 (7); m.^{4} is 15·5 and 16·9 (2); the premolar from 9·0 to 10·5 (5); the first four cheek-teeth from 43·7 to 46·7 (2); the first three molars from 40·0 to 45.0 (3); m^2, m.^{3} from 30·1 to 32·0 (6); m.^{3} from 15·6 to 17·6 (6); m.^{2} 12·6 (bis.).

Young: P.^{3}, mp.^{4}, m.^{1}, m.^{2}, m.^{3} are 56·7 and 63·5 (2); p.^{3}, mp.^{4}, m.^{1}, m.^{2} 45·2 and 45·4 (2); p.^{3}, mp.^{4}, m.^{1} are 35·5 (1); p.^{3}, mp.^{4} 20·4 (1); p.^{3} from 9·0 to 10·0 (6); mp.^{4}, m.^{1}, m.^{2} from 35·4 to 38·7 (3); mp.^{4}, m.^{1} 26·5 (1); m.^{1}, m.^{2} 25·8 and 27·7 (2); m.^{3} from 14·2 to 16·4 (3).

The widths of the lower and upper teeth are as 13 to 14; in *M. giganteus* the ratio is 7 : 8; in *M. robustus* 19 : 20; in most other recent species the difference is much greater than in *M. giganteus.*

In mandibular dimensions *M. magister* has no special relation to either of the recent kangaroos. Though the length of its cheek-teeth is but little more than a fourth greater, the mean width of the series at m.^{3} is more than twice as great, while the thickness of the mandible and its depth are only about one-half greater than in *M. giganteus*, *robustus* and *rufus*. In range of depth it somewhat exceeds the greatest attained by a recent species, *H. dorsalis*, to wit.

Form.

Mandibular.—P.^{4} (Pl. XVIII. fig. 12) is short, with mesial diameters 7·0 : 3·5. Anterior lobe the shorter, longitudinally compressed, lancet-shaped; the posterior single, or with its anterior two-fifths forming a subdivision obscurely defined by a vertical groove on the outer side, and a notch in the crest. Crest curving without interruption on to the intero-posterior cusp, which is only separated from the lobe by a shallow vertical groove on the upper mesial part of the posterior surface, and forms with it anteriorly a concave intero-posterior face.

P.^{3} (Pl. XVIII. fig. 11) is short, with mesial diameters 8·9 : 4·5, similar to p.^{4} in structure, but larger in size. The anterior lobe is relatively larger; the intero-posterior cusp is higher than the hinder lobe, compressed, acuminate and separated from the lobe by a deep notch both superiorly and posteriorly.

The vertical groove on the hinder surface of the molars is sometimes double; frequently its base is enclosed by an elevated rim which may bulge outward and convert the groove into a deep pocket.

Maxillary.—P.^{4} (Pl. XVIII. fig. 14) has a general resemblance to the lower premolar, but the anterior lobe is much shorter and lower than the posterior, the long compressed blade of which bears low down on its intero-posterior surface a small trihedral pointed cusp. On the intero-anterior base of the fore lobe is a tumid margin *a*, representing perhaps the last trace of an inner ledge. Mesial diameters 10·5 x 4·7.

P.^{3} (Pl. XVIII. fig. 13) is almost equally bilobed; the maiden state of its surface is not exemplified, but from vestiges left in the worn tooth it may be safely said to have had a ledge running the whole length of its inner side and terminating in an intero-posterior cusp; the hinder lobe is furnished with a well developed extero-posterior cusp (*a*, Pl. XVIII. fig. 15), a feature which occurs in the recent *M. giganteus*, but in one other instance only among extinct Macropods in *Sthenurus*.

Examples—two hundred and eighty-three.

The collection embraces 134 adults, 40 adolescents, and 47 young mandibles—47 adult and 15 young maxillæ, besides isolated teeth in large number. The identity of young specimens has in the great majority of instances been established by extraction of the permanent premolars from their crypts.

It may be observed that Owen's *M. titan*, from the Wellington Caves, has not been recognised among the fossils of the Darling Downs.

MACROPUS PAN, n.s.

Molars elongate with curved crests, rounded angles and strong links. Anterior upper molars with the outer midvalley divided by a vertical plate; all with an adpressed fold posteriorly. Lower molars with a vertical groove posteriorly. Upper premolars unilobate with an internal ledge and intero-posterior cusp. Lower premolar unilobate, with an intero-posterior cusp. Size somewhat larger than *M. magister*.

The types of the species are the maxillaries alone; there is at present no direct evidence showing that the mandibles are rightly associated with them.

Dimensions.

Maxillary.—Adult and adolescent: The first four cheek-teeth are in length 55·0 and 55·5 (2). The true molar series is 53·6 and 61·5 (2); the last three molars 44·5 to 55·0 (4); the last two 36·0 (1); the last 19·2 (1); the first three 41·3 (1); m.^{2}, m.^{3} from 30·1 to 37·1 (5); p.^{4} is from 11·0 to 12·3 (3). The width of m.^{3} is from 11·7 to 13·6 (14).

Young: The series mp.^{4}, m.^{1}, m.^{2} is 40·0 (1).

Mandibular.—Adult and adolescent: The cheek series varies in length from 61·0 to 70·0 (2); the last three from 42·7 to 54·0 (4). The first four cheek-teeth are 52·2 in length, the first two true molars from 26·8 to 29·6 (3); the last two from 35·5 to 39·5; the first three are 45·6 (1); m.^{2} m.^{3} are 35·2 (1); m.^{1} 12·0 and 12·5 (2); m.^{2} from 16·9 to 17·4 (3); m.^{3} from 17·5 to 20·0 (8); m.^{4} from 18·7 to 20·5; p.^{4} from 8·0 to 10·0 (4). The width of m.^{3} is from 8·9 to 12·6 (24). The anterior depth of the mandible varies from 24·6 to 46·2 (13); the posterior from 23·5 to 36·6; its thickness from 15·8 to 25·1 (27). The latter measurements much exceed the greatest amount of difference in living species, and clearly indicate a confusion of two distinct species, but the means of distinguishing these otherwise than by size are as yet wanting.

Form.

Maxillary.—P.^{4} (Pl. XVIII. fig. 8). Obovate with diameters 11·0 and 6·6. Crest oblique, parallel with the outer side, notched at anterior third. An intero-posterior cusp *a*, separated from the lobe apically by a notch, posteriorly by a broad groove descending half way to the base, is connected with the fore end of the crown by a raised tubercular basal rim enclosing a concave ledge. Outer surface of crown impressed at anterior third, the impression defining the outer edge of an anterior cusp *b*; on the posterior half of the impression are two very distinct vertical ribs. In a maxilla which seems to belong to this species the premolar (Pl. XVIII. fig. 8) is elongate obovate, with diameters 12·3 and 5·7 and a little contracted at the anterior third. The intero-posterior tubercle is more entirely separated from the lobe; and the whole tooth has a facies different from that of the preceding tooth, which may be taken as the type of the species. Yet as m.[1] in this maxilla has relics of the sepiment in its outer midvalley, and as the variation in the premolar may be paralleled among recent species, there is not at present sufficient ground for referring it to a separate species.

Molars (Pl. XVIII. fig. 10).—The posterior molars differ in no respect from those of *M. magister* save in somewhat superior size; m.[2] most frequently shows a vertical fold descending from the middle of the hinder surface of the fore lobe external to the mid-link, and meeting its fellow of the opposite side at the bottom of the valley *b*; or as in the type specimen forming there an erect plate. In m.[1] this fold forms a more complete sepiment *a* from lobe to lobe; it is constant in occurrence, and traces of it are visible as long as the lobes persist. It is not a little remarkable that this one of the structural characters of *Palorchestes* should reappear in a species of *Macropus*.

Mandibular.—P.[4] (Pl. XVIII. fig. 7) ovate, with the sides mesially contracted, and with diameters 8·0 and 4·0. Crest mesial; a very small intero-posterior cusp separated from the lobe apically and posteriorly; inner side of crown somewhat concave in front of the cusp, outer rather concave with one or two obscure ribs about the middle. The cusp disappears under wear. A series of four young teeth extracted from their crypts at an early stage of growth or exposed from above shows that the tooth in its growth undergoes considerable change of form. At the earliest phase observed it resembles in shape the end of a cold chisel with a dent on each side of the middle of its edge, the mid-point being the termination of a rib on the outer side; the intero-posterior cusp is as yet obscurely defined; in a somewhat older example the crown is thickened and rounded at each end, two ribs appear on the outer side, and the intero-posterior cusp is more distinct; when near emergence the tooth gains greater robustness, and the cusp becomes exserted from the lobe.

Molars (Pl. XVIII. fig. 9) undistinguishable from those of *M. magister*.

The undulation of the lower contour line of the mandible is well marked.

Rise and fall of teeth.

Of this little is known; p.^{4} is newly arisen, and $\overline{\text{p.}^4}$ is not entirely up when the hind lobe of m.^{3} is coming into use; by the time that the hind lobe of m.^{4} gets into wear, p.^{4} is moderately worn and procumbent, whence we may infer that it is thrust out soon afterwards while still serviceable.

Examples—fifty-four.

These include besides the young maxilla forming the type—Four adult maxillæ; two with premolars, and all with m.^{1} among the teeth preserved; twelve others in which m.^{2} shows its characteristic more or less perfectly; one with m.^{3}, m.^{4}; one with m.^{3}; and one with m.^{4} referred to the species merely on account of similarity of size.

In four adolescent mandibles the well-preserved premolars alone effectually prevent the molars behind them being ascribed to *M. magister*, as they might otherwise have been on seemingly sufficient grounds, and well illustrate the folly of positively identifying kangaroo mandibles by molars only. Twenty-seven others are provisionally determined by the dimensions of the teeth.

MACROPUS FAUNUS, n.s.

Molars with curved crests, rounded angles and strong links.

Upper premolar tricuspid, without ledge on the inner side, but with an intero-posterior member simulating the corresponding portion of the true molars. Molars smooth. Lower premolar tricuspid. Palate entire. Size large.

Dimensions.

Maxillary.—Length of the cheek-teeth 70·5 (estimated), of the first four 55·5 (1); of p.^{4} 11·0 (1). Width of m.^{3} 12·5 and 12·8 (2).

Mandibular.—Length of the cheek-teeth 57·0 to 62·6 (2); of p.^{4} 7·0, 7·2 and 8·0 (3); of p.^{4}, m^1 18·0 (1). Width of m.^{3} 9·5 to 10·1 (2); anterior depth 25·8 and 29·0 (3); posterior 28·0 and 29·0 (2). Thickness 19·7 and 21·0 (2). Internal length 82·0.

Form.

Maxillary.—P.^{4} (Pl. XVIII. fig. 4) irregularly elongate-ovate, tricuspid; the mesial cusp the shortest, cuneiform; the anterior a compressed cone. The large inner portion of the posterior cusp is fused with the outer; its posterior base folds backwards and outwards behind the base of the outer portion so that the posterior surface of the tooth has a remarkable resemblance to that of the molars of the kangaroos. The inner ledge is represented by a low basal tubercle opposite the interval between the anterior and mesial cusp. Diameters 11·0 and 4·6.

Molars (Pl. XVIII. fig. 5) not distinguishable in form from those of *M. magister* and *pan.*

Mandibular.—P^4 (Pl. XVIII. fig. 3). Diameters 8·0 and 3·4. Tricuspid, elongate-ovate. Crest parallel with outer side, curving inwards posteriorly; mesial cusp the shortest, cuneiform. Crown tumid on intero-posterior angle but not developing a distinct cusp.

Molars (Pl. XVIII. fig. 6) as in *M. magister* and *pan.*

Lower contour line of mandible undulatory.

Rise and fall of teeth.

The mandibular premolar is procumbent on the verge of the diastema when the hind lobe of m.^{4} is just showing effects of wear.

Examples—six.

The type maxilla with p.^{4}, m.^{1}, m.^{2}, m.^{3}—A portion of a left maxilla with m.^{3}, m.^{4} (provisional)—A mandible with all the cheek-teeth and a portion of a second with p.^{4}, m.^{1}—A pair of mandibles, one with all the cheek-teeth, the other lacking only the premolar.

The close similarity in form between the upper and lower premolars strongly suggests their co-specific origin. The molars accompanying them could not without them be dissociated from those of the other great kangaroos.

SYNAPTODON, de Vis.

Synaptodon, de Vis, Proc. Roy. Soc. Queensland, Vol. v., p. 159.

Molars distant at base, in contact by faceted projections (talons) fore and aft.

SYNAPTODON ÆVORUM, de Vis (*l.c.*).

Dimensions of a molar 9·0 x 5·0; space between the teeth nearly equal to the length of the fore lobe.

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XXIV. PROCEEDINGS OF LINNEAN SOCIETY OF NEW SOUTH WALES.

EXPLANATION OF PLATES.

Plate XIV.

Palorchestes azael, Ow.

Fig. 1—Lower deciduous premolar.
Fig. 2—First lower true molar—young.
Fig. 3—Anterior upper molars—young.
Fig. 4—Lower permanent premolar.
Fig. 5—Upper permanent premolar.
Fig. 6—Last upper molar.

Palorchestes parvus.

Fig. 7—First upper molar—young.
Fig. 8—Upper molar series.
Fig. 9—Lower molar series.
Fig. 10—Upper incisors.

Plate XV.

Sthenurus pales.

Fig. 1—First three lower molars.
Fig. 2—Upper premolar.
Fig. 3—Lower premolar.
Fig. 4—Hinder surface of third lower molar.

Sthenurus goliah, Ow.

Fig. 5—Upper deciduous premolar—imperfect.
Fig. 6—Upper permanent premolar in crypt.
Fig. 7—Lower permanent premolar.
Fig. 8—Hinder surface of first upper molar.
Fig. 9—Hinder surface of last upper molar.

Plate XVI.

Sthenurus otuel, Ow.

Fig. 1—Lower permanent premolar.
Fig. 2—Lower third molar.
Fig. 3—Upper permanent premolar.
Fig. 4—Upper third molar.

Sthenurus oreas.

Fig. 5—Lower permanent premolar.
Fig. 6—Lower third molar.
Fig. 7—Upper permanent premolar.
Fig. 8—Upper third molar.

Sthenurus atlas.

Fig. 9—Lower deciduous premolar—imperfect.
Fig. 10—Lower permanent premolar.
Fig. 11—Last lower molar—imperfect.

Halmaturus vinceus.

Fig. 12—Upper permanent premolar.
Fig. 13—Lower permanent premolar.
Fig. 14—Upper third molar.
Fig. 15—Lower third molar.

Plate XVII.

Halmaturus thor.

Fig. 1—Lower permanent premolar.
Fig. 2—Lower third molar.

Halmaturus vishnu.

Fig. 3—Lower permanent premolar.
Fig. 4—Lower third molar.

Halmaturus anak, Ow.

Fig. 5—Lower deciduous premolar.
Fig. 6—Lower permanent premolar.
Fig. 7—Upper deciduous premolar.
Fig. 8—Upper permanent premolar.
Fig. 9—Lower third molar.
Fig. 10—Upper third molar.

Halmaturus dryas.

Fig. 11—Lower deciduous premolar.
Fig. 12—Lower permanent premolar.
Fig. 13—Upper permanent premolar.
Fig. 14—Lower third molar.
Fig. 15—Upper third molar.

Halmaturus odin.

Fig. 16—Lower permanent premolar.
Fig. 17—Lower third molar.

Halmaturus indra.

Fig. 18—Lower deciduous premolar.
Fig. 19—Lower permanent premolar.
Fig. 20—Lower first molar.

Halmaturus siva.

Fig. 21—Lower permanent premolar.
Fig. 22—Lower third molar.
Fig. 23—Upper third molar.

Halmaturus cooperi, Ow.

Fig. 24—Lower deciduous premolar.
Fig. 25—Lower permanent premolar.
Fig. 26—Lower third molar.
Fig. 27—Upper third molar.
Fig. 28—Upper permanent premolar.

Plate XVIII.

Halmaturus minor, Ow.

Fig. 1—Lower permanent premolar.
Fig. 2—Lower third molar.

Macropus faunus.

Fig. 3—Lower permanent premolar.
Fig. 4—Upper permanent premolar.
Fig. 5—Upper third molar.
Fig. 6—Lower third molar.

Macropus pan.

Fig. 7—Lower permanent premolar.
Fig. 8—Upper permanent premolar.
Fig. 9—Lower third molar.
Fig. 10—Upper third molar.

Macropus magister.

Fig. 11—Lower deciduous premolar.
Fig. 12—Lower permanent premolar.
Fig. 13—Upper deciduous premolar.
Fig. 14—Upper permanent premolar.
Fig. 15—Lower third molar.
Fig. 16—Upper third molar.

CORRIGENDA.

Page 78, in the last two lines—read *O. frenata* and *P. penicillata.*
Page 84, line 27—*insert* $m.^1$ between $mp.^4$ and $m.^2$
Page 85, line 15—*add* ; of the entire series of cheek teeth 98·5 (1).
Page 87, line 26—*for* premolars *read* the left premolar.
Page 88, line 4—*for* A second example, hinder portion, &c., *read* A second example—Hinder portion, &c.
Page 89, line 15—for *orcas* read *oreas*.
Page 93, line 4—after young *add* Cast of portion of a right maxilla with $m.^3$ $m.^4$ (10223) ; adult.
Page 94, line 5—the word but at the end of the line should have been omitted.
Page 99, lines 17, 29 and 31—*for* $P.^4$ *read* in each case $\overline{P.}^4$
Page 100, line 2—*for* $P.^4$ *read* $\overline{P.}^4$
Page 107, line 35—*for* lightly *read* slightly.