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SOME QUANTITATIVE DENTAL CHARACTERISTICS OF THE CHIMPANZEE, GORILLA AND ORANG-OUTANG

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[Plate 26]

Measurements have been taken of the crowns of the teeth of seventy-nine chimpanzees, eighty-nine gorillas and sixty-three orang-outangs. Basic statistical data, comprising the mean, the number of skulls, the standard deviation and the standard error of the mean, are presented for forty-eight dimensions and indices of the deciduous teeth and for seventy-eight of those of the permanent dentition of each type of ape. A separation between the sexes has been made in the case of the permanent teeth. Further separation has been made into age groups, where necessitated by changes in dimensions due to wear. Even with the small samples resulting from these subdivisions, the standard error is seldom greater than 4% of the mean, and therefore the figures obtained are reliable estimates of the variability of the teeth of apes. The data provide a basis for quantitative comparisons between the teeth of existing and fossil anthropoids.

Introduction

In the most recent taxonomic list, man and the apes are classified together in the superfamily Hominoidea (Simpson 1945). They share a common dental pattern of two incisors, a canine, two premolars, and three molars, and the basic cusp pattern of the molars and premolars is the same in all divisions of this superfamily. Differences of a kind that are usually treated qualitatively occur, however, both between the teeth of man and the apes, and between those of the apes themselves. Some of them are quantitative expressions of the relative size of the jaws and the degree of development of the canines. Such differences may in turn be overlaid by differences in the shape and disposition of the main cusps, in enamel pattern, and in the degree of development of certain small and variable cusps. For example, the enamel of the molar teeth of the orang-outang differs from that of the African apes and man by being crenated, while individual animals of all species occasionally possess small additional cusps, sometimes arising, like the 'Carabelli' cusps, as excrescences of the cingulum. Associated with these two categories of difference in the characters of the crowns there are differences in the number of the roots of the premolar and molar teeth.

Comparisons between the teeth of man and the apes, and between the teeth of extant and fossil apes, have to take account of all these kinds of differences. Many are essentially a measure of the relative degree of development of the same basic characters, and almost all are amenable to statistical analysis. In spite of this obvious fact, the quantitative aspects of comparative odontology have been little emphasized in recent years. Very few figures have ever been published about dimensions of the teeth of extant species of ape, and such as are available have neither been treated by the methods of modern statistics, nor have they as a rule been presented in a way which allows of statistical analysis by other

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workers. As a result, an investigator who wishes to know whether the tooth of a fossil ape, which does not differ in basic pattern from the corresponding tooth of existing apes, may nevertheless differ significantly in size, has no material on which to base his examination. The usual procedure in such cases as, for example, in all recent statements about the south and east African fossil anthropoids, has been for the comparison to be made with a small number of skulls of chimpanzee or gorilla closest to hand. Such comparisons do not involve an adequate estimate, if indeed any at all, of the variance of the dimensions of the teeth of either the extant or the fossil apes. In general, the result is that the conclusions to which they point may have little scientific validity.

The present study was undertaken in order to provide fundamental statistical data about the teeth of existing anthropoid apes, as a basis for comparisons with fossil Primates.

Material and methods

Skulls

Measurements were first taken of the teeth of seventy-nine skulls of the chimpanzee, eighty-nine of the gorilla, and fifty-three of the orang-outang. All these skulls were in the collections of the Royal College of Surgeons, London, and the British Museum of Natural History, London. The orang-outang series was supplemented by ten specimens from the Departments of Human Anatomy of the Universities of Birmingham and Sheffield, and University College, London; from the Departments of Zoology of the Universities of Leeds and Sheffield, and from the Rothschild Museum, Tring.

Sexing

Sexual dimorphism is marked in all the three genera of apes studied. The sexes of few of the specimens were known from field records, and a separation was made between adult male and female skulls by a qualitative examination of (*a*) the size of the canine teeth; (*b*) the degree of development of the muscular markings and crests; (*c*) size.

Comparison between the male and female groups sexed in this way shows that in all the dimensions which are not affected by attrition, every male tooth is larger than the corresponding female tooth, the difference being in most cases statistically significant. This observation provides a reasonable check on the adequacy of our sex diagnosis.

Skulls whose second permanent molars have not yet erupted cannot be sexed with any measure of reliability. Consequently, no separation between the sexes was attempted for the measurements of the deciduous teeth.

Measurement

Technique

All measurements were taken with engineers' straight-jaw vernier calipers, or with fine-pointed dividers fitted with a spring and locking device. Measurements were recorded to the nearest 0·01 cm., and repeated checks of both the accuracy of the instruments and the techniques of measurement followed were made on standard blocks.

In the course of the field work, the teeth of a single green monkey (*Cercopithecus aethiops sabaeus*) were repeatedly measured. The maximum divergence between corresponding measurements was 0·05 cm.

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As a further check on the reliability of the techniques of measurement, the teeth of ten female baboons (*Papio porcarius*) were measured three times, two years after the original measurements had been taken. Analyses of the variance of these four sets of measurements showed that in 118 cases that part which was due to differences between animals was very significantly greater ($P \leqslant 0{\cdot}001$) than that which was due to errors in biometric technique. In the remaining two cases, the difference was still highly significant, P being approximately equal to 0·01. It is safe to conclude, therefore, that inaccuracies of measurement do not affect our final estimates in any material way.

Dimensions and indices

In the following descriptions, height always refers to measurements taken perpendicularly to the alveolar margin; and breadth to those taken in the labio-lingual direction.

(*a*) *Incisors*. The height of the labial and lingual faces of each incisor tooth was measured along the centre of the crown from the enamel line to the incisive edge ($LaH1$ and $LiH1$), figures 1, 2, 5 and 6, plate 26). The maximum transverse dimension of each face (LaW and LiW) was taken at right angles to the height (figures 1, 2, 5 and 6). The maximum labio-lingual breadth of the crown ($b1$) was measured parallel to the occlusal plane (figures 3 and 7).

(*b*) *Canines*. Four measurements were taken of each canine. The heights of the labial ($LaH2$) and lingual ($LiH2$) faces were recorded as the shortest distance from the point of the canine to the centre of the enamel line on each face (figures 1, 2, 5 and 6). The maximum antero-posterior dimension of each canine (l) was taken from the most anterior to the most posterior point on the enamel line as seen from the labial aspect (figures 1 and 5). The maximum labio-lingual breadth of the tooth ($b2$) was measured parallel to the occlusal plane (figures 3 and 7, plate 26).

(*c*) *Premolars and molars*. The antero-posterior length of the crown of each premolar ($L1$) and molar ($L2$) was measured in the occlusal plane between the points of contact of the tooth with those anterior and posterior to it (figures 4 and 8, plate 26). The maximum breadth of each premolar (B) was measured at right angles to its length. The breadths of both the trigone (trigonid) (TrB) and talon (talonid) (TaB) of each molar were taken similarly (figures 4 and 8). The greater of these two measurements was recorded as the maximum breadth of the tooth.

The first and second deciduous molars were measured in the same way as permanent premolars and permanent molars respectively. The index of the crown of each premolar was computed by multiplying the breadth by 100 and dividing by the length. Two indices were computed for each molar tooth—the trigone (trigonid) index ($100\ TrB/L2$) and the talon (talonid) index ($100\ TaB/L2$).

Ageing

Some of the measurements which were taken, notably those of the height and width of the incisors, and of the height of the canines, are affected by wear, and thus indirectly by age. In considering these dimensions, it is therefore necessary to separate young from old skulls. As many of the fossil apes which have to be compared with existing apes consist only of fragments of teeth and jaws, no indication of age is provided by any other cranial features. In the present study it was, therefore, thought advisable to use only the

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degree of attrition of the molar teeth to distinguish between young and old adult skulls, and to disregard such other cranial features as closure of the sutures.

Our observations show that in the great apes, the protocone and hypocone of the upper, and the protoconid, hypoconid, and hypoconulid, of the lower molars, are the first to show attrition and exposure of the dentine. The first permanent molars not infrequently show signs of attrition before the complete permanent dentition is in place (Schultz 1935). In view of this fact, and because the present study revealed a close, but not complete correlation between the degree of attrition of the upper and lower teeth, the degree of wear of the second lower molars was taken as an index of age, even when both upper and lower teeth were available.

Adult specimens with the complete permanent dentition in place, but not showing wear on either of the medial two cusps of the lower second molar, were classified as young adults, and those showing wear on one or both of these two cusps, in addition to the three lateral ones, were classified as old adults. The number of subadult specimens in which some permanent teeth had erupted, and whose sexes could be assessed with reasonable certainty, was so small that the measurements of their permanent teeth were not included in the present study.

Several deciduous teeth persist until some of the permanent teeth are in place. When measurements of the deciduous teeth were being considered, specimens were therefore grouped as 'infants', in which some or all of the milk teeth had erupted, but in which no permanent teeth were in place; and as 'juveniles', in which the deciduous dentition was in place together with some permanent teeth.

Statistical analysis

(*a*) *Computation of the basic statistics.* The basic statistics for the series of measurements of teeth from the right and left sides of each jaw were first computed separately. The significance of the difference between the variances of corresponding series from the left and right sides was tested by a variance ratio, and unless this difference was significant, the means were compared by the t test described by Fisher (1946). Otherwise, the means were compared by a t test in which the sums of squares were not pooled.

The genetic and environmental factors which underlie differences between corresponding bilateral structures in different animals can, *a priori*, be taken to be more pronounced than those which underlie differences between the members of a pair of corresponding attributes in the same animal. In the total series of 1224 pairs of measurements, there were only twelve significant differences ($P \leqslant 0{\cdot}02$) between variances of corresponding measurements of right and left teeth, and one between their means. Even if both samples had been randomly drawn from one homogeneous population, with the level of significance arbitrarily fixed at 0·02, one in fifty would be expected to show a significant difference in any such series of multiple tests. Both on general grounds, therefore, and in view of the very small numbers of significant differences which appeared in this analysis, it was not considered justifiable to treat corresponding measurements of teeth from the left and right sides as independent variates. The variance of the distribution of each measurement was therefore partitioned so as to define that part due to differences between animals, the variance due to differences between teeth from the left and right sides of each jaw being eliminated. As the former

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refers to the variance between animals, it has one degree of freedom less than the number of skulls examined. The mean is, however, based on the total number of teeth, and its variance was therefore obtained by dividing the variance between animals by the number of teeth. As some specimens were imperfect, this was not always exactly twice the number of skulls.

(*b*) *Comparisons between the age groups*. In order to discover whether the dimensions of the teeth did show any important differences with age, comparisons were made, by means of *t* tests and variance ratios, between the means and variances of corresponding measurements of the deciduous teeth of the infant and juvenile series, and of those of the permanent teeth of young and old adult specimens of each sex for each of the three apes. Where corresponding dimensions of the same tooth were similar in the young and older groups, the data for each were usually pooled and recomputed. When this was done, the males and females of each genus of ape were always treated similarly, in order to facilitate comparison with fossil skulls.

As a result of this analysis, the measurements of all the deciduous teeth of the infants and juveniles, and all those of the premolars and permanent molars of both the young and old adult males and females of each genus of ape were pooled. In the gorilla all the measurements of the crowns of the incisor teeth, and in the chimpanzee and orang-outang all except their labio-lingual breadth, were treated separately for young and old adults. Only the maximum antero-posterior dimension and breadth of both the upper and lower canines of the young and old adult gorillas, and the upper canines of the chimpanzee, were grouped, but all corresponding dimensions of the lower canine of the young and old adult chimpanzee and of both the upper and lower canines of the young and old adult orang-outang were pooled.

Results

The tables

The basic statistics for each series of measurements of the teeth of the three genera of modern apes are given in tables 1 to 7 at the end of the paper.

All the samples considered in this study are relatively small, but in only a few cases is the standard error of the mean of any measurement greater than 3 to 4% of the mean itself. It follows, therefore, that the statistics obtained are reliable estimates of those of the population from which the samples were drawn. Moreover, it is worth noting that in order to obtain standard errors of half the order of magnitude of those in the present study (3 to 4%) it would be necessary to study four times as many specimens as were actually measured. Allowance for such errors in the basic statistics as are due to random sampling can be made in comparisons with the measurements of individual fossils.

Use of the tables

These basic statistical data allow one to determine the probability of any dimension of a fossil ape tooth falling within the range of variation of the corresponding measurement in a modern great ape. The deviation of the measurement in the fossil from the corresponding mean value in the modern ape is divided by the standard deviation of the distribution of individual measurements, and the probability determined from Fisher & Yates's (1948) table of *t*, which is entered with a number of degrees of freedom one less

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than the number of skulls in the sample from which the mean was derived. The use of the t table, rather than that of the normal deviate, compensates for errors of random sampling which may result from limitations in the size of the samples of modern apes. The probability obtained from such an analysis is a measure of the confidence that can be placed in the view that any difference between a measurement of a fossil and the mean value of the corresponding measurement of a modern ape is real and not due to sampling errors. It furnishes no estimate whatever of the extent to which the one deviates from the other.

When only single fossils are available, it is impossible to estimate the variance of the fossil species. Consequently, should the specimen be grossly abnormal, spurious results may be obtained from any comparisons that might be instituted. If, as is more reasonable to suppose, the fossil is a random specimen from a fairly homogeneous population, the chances of any one of its dimensions being significantly different from the mean value for the fossil population are small. If more than one fossil specimen is available, some estimate can be made of the variance of the extinct group, and comparisons with the modern apes may then be made by the usual t test (Fisher 1946).

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Tables 1 to 7

Summary of the basic statistics of the dental dimensions and indices of the chimpanzee, gorilla and orang-outang.
All lengths are expressed as 10^{-2} cm.

Key to contractions used in headings

s.d. = standard deviation
s.e. = standard error
max. lab. trans. = maximum labial transverse
max. lin. trans. = maximum lingual transverse
lab. lin. breadth = labio-lingual breadth
max. A.-P. dim. = maximum anterior-posterior dimension

Table 1. Anthropoid teeth (milk dentition)

		upper first incisor					upper second incisor					lower first incisor				
		max. lab. trans.	lab. height	max lin. trans.	lin. height	lab.-lin. breadth	max. lab. trans.	lab. height	max. lin. trans.	lin. height	lab.-lin. breadth	max. lab. trans.	lab. height	max. lin. trans.	lin. height	lab.-lin. breadth
chimpanzee	mean	81·06	56·94	76·67	67·63	53·17	62·45	45·30	59·60	61·06	47·35	55·05	58·30	54·40	68·30	48·40
	no. of animals	11	11	11	10	11	12	12	12	11	12	12	12	12	12	12
	s.d.	5·39	8·85	7·75	3·30	3·85	6·96	8·71	6·06	8·67	5·03	4·16	5·61	6·38	6·35	3·66
	s.e. of mean	1·27	2·09	1·83	0·83	0·91	1·56	1·95	1·36	2·04	1·12	0·93	1·25	1·43	1·42	0·82
orang-outang	mean	94·14	69·00	91·59	74·64	69·14	67·78	52·00	66·89	68·06	55·44	63·61	71·28	61·39	78·89	54·72
	no. of animals	12	12	12	12	12	10	10	10	10	10	10	10	10	10	10
	s.d.	11·05	14·12	12·26	18·89	8·57	9·45	14·10	12·67	13·30	6·58	8·88	16·22	7·55	11·63	7·33
	s.e. of mean	2·36	3·01	2·61	4·03	1·83	2·23	3·32	2·99	3·13	1·55	2·09	3·82	1·78	2·74	1·73
gorilla	mean	80·43	54·87	77·52	66·26	56·35	57·64	43·18	55·95	57·41	47·50	45·47	51·24	45·29	58·29	43·41
	no. of animals	12	12	12	12	12	11	11	11	11	11	9	9	9	9	9
	s.d.	9·22	13·06	8·40	12·90	6·33	4·82	9·82	4·53	9·21	6·93	5·14	13·36	6·10	8·29	4·49
	s.e. of mean	1·92	2·72	1·75	2·69	1·32	1·03	2·09	0·97	1·96	1·48	1·25	3·24	1·48	2·01	1·09

		lower second incisor					upper canine					lower canine				
		max. lab. trans.	lab. height	max. lin. trans.	lin. height	lab.-lin. breadth	lab. height	lin. height	max. A.-P. dim.	lab.-lin. breadth	index	lab. height	lin. height	max. A.-P. dim.	lab.-lin. breadth	index
chimpanzee	mean	59·27	60·23	57·73	73·68	55·41	81·63	82·52	78·81	56·59	72·19	82·96	81·93	69·37	61·81	90·04
	no. of animals	13	13	13	13	13	16	16	16	16	16	15	15	15	15	15
	s.d.	6·33	11·29	5·22	8·78	4·96	12·28	9·46	8·08	6·99	10·02	8·96	10·37	10·61	4·89	12·09
	s.e. of mean	1·35	2·41	1·11	1·87	1·06	2·36	1·82	1·56	1·35	1·93	1·72	2·00	2·04	0·94	2·33
orang-outang	mean	63·93	74·47	65·00	85·00	58·47	91·48	96·35	93·00	72·48	77·96	90·67	98·13	85·47	69·00	80·57
	no. of animals	8	8	8	8	8	13	13	13	13	13	9	9	9	8	8
	s.d.	6·22	8·73	5·10	7·21	5·62	19·97	13·56	7·77	6·58	3·66	14·56	14·14	9·00	7·52	4·11
	s.e. of mean	1·61	2·26	1·32	1·86	1·45	4·16	2·83	1·62	1·37	0·76	3·76	3·65	2·32	2·01	1·10
gorilla	mean	52·67	72·61	54·61	78·39	55·11	108·48	116·12	106·50	80·00	75·17	109·91	106·14	89·52	70·43	79·38
	no. of animals	10	10	10	10	10	17	16	17	16	16	13	12	13	12	12
	s.d.	7·09	15·05	6·85	13·44	6·94	18·77	18·33	9·60	19·31	6·36	21·39	14·18	8·57	9·17	8·12
	s.e. of mean	1·67	3·55	1·61	3·17	1·64	3·49	3·60	1·75	3·59	1·18	4·46	3·10	1·79	2·00	1·77

		upper first molar			upper second molar						lower first molar			lower second molar					
		A.-P. length	max. breadth	index	A.-P. length	trigone breadth	talon breadth	max. breadth	trigone index	talon index	A.-P. length	max. breadth	index	A.-P. length	trigonid breadth	talonid breadth	max. breadth	trigonid index	talonid index
chimpanzee	mean	74·76	69·24	93·21	83·79	90·00	87·86	90·21	107·59	105·00	80·00	53·39	66·77	90·32	72·61	74·94	75·52	80·61	83·23
	no. of animals	17	17	17	16	16	16	16	16	16	17	17	17	17	17	17	17	17	17
	s.d.	8·06	6·23	10·97	7·81	7·88	7·82	7·71	5·63	7·26	6·82	6·96	6·20	8·12	7·65	7·61	7·75	5·17	4·85
	s.e. of mean	1·50	1·16	2·04	1·45	1·46	1·45	1·43	1·05	1·35	1·23	1·25	1·11	1·46	1·37	1·37	1·39	0·93	0·87
orang-outang	mean	84·25	93·75	111·57	102·37	107·26	103·93	108·19	104·85	101·67	97·42	72·42	74·69	115·23	89·82	92·73	93·32	77·86	80·41
	no. of animals	15	15	15	14	14	14	14	14	14	13	13	13	11	11	11	11	11	11
	s.d.	10·06	8·44	8·26	11·46	12·13	10·60	12·26	5·82	6·10	15·34	8·05	5·66	12·12	10·01	12·57	11·79	3·65	4·82
	s.e. of mean	1·90	1·60	1·56	2·21	2·34	2·04	2·36	1·12	1·17	3·01	1·58	1·11	2·59	2·14	2·68	2·52	0·78	1·03
gorilla	mean	104·94	103·28	98·59	123·63	122·47	117·10	122·53	99·13	94·80	113·26	75·04	66·17	136·09	101·77	102·00	103·45	74·77	75·05
	no. of animals	17	17	17	16	16	16	16	16	16	12	12	12	12	12	12	12	12	12
	s.d.	7·50	7·06	7·75	8·60	11·22	10·76	11·17	6·98	6·35	8·51	7·59	3·32	9·88	11·54	10·54	11·00	4·41	4·63
	s.e. of mean	1·33	1·25	1·37	1·57	2·05	1·97	2·04	1·28	1·16	1·77	1·58	0·69	2·11	2·46	2·25	2·35	0·94	0·99

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TABLE 2. MALE CHIMPANZEE

		upper first incisor					upper second incisor					lower first incisor				
		max. lab. trans.	lab. height	max. lin. trans.	lin. height	lab.-lin. breadth	max. lab. trans.	lab. height	max. lin. trans.	lin. height	lab.-lin. breadth	max. lab. trans.	lab. height	max. lin. trans.	lin. height	lab.-lin. breadth
young adults	mean	114·10	113·50	109·60	120·70	—	86·80	101·10	85·60	112·80	—	78·88	103·50	77·38	113·75	—
	no. of animals	5	5	5	5	—	5	5	5	5		4	4	4	4	
	S.D.	7·02	17·62	3·57	8·82	—	6·56	13·84	8·37	6·54	—	6·90	17·25	8·91	12·70	—
	S.E. of mean	2·22	5·57	1·13	2·79	—	2·07	4·38	2·65	2·07	—	2·44	6·10	3·15	4·49	—
old adults	mean	100·09	72·90	101·62	101·70	—	79·55	72·06	84·00	97·37	—	70·41	75·52	67·45	101·29	—
	no. of animals	13	12	12	12	—	13	12	12	12	—	12	11	12	11	—
	S.D.	21·81	30·80	17·07	18·05	—	15·88	25·31	16·12	16·74	—	12·60	26·08	16·03	18·92	—
	S.E. of mean	4·55	6·89	3·73	4·04	—	3·55	5·97	3·80	3·84	—	2·69	5.69	3·42	4·13	—
young and old adults grouped	mean	—	—	—	—	89·34	—	—	—	—	82·73	—	—	—	—	85·62
	no. of animals	—	—	—	—	18	—	—	—	—	18	—	—	—	—	15
	S.D.	—	—	—	—	11·17	—	—	—	—	10·29	—	—	—	—	5·29
	S.E. of mean	—	—	—	—	1·97	—	—	—	—	1·88	—	—	—	—	0·98

		lower second incisor					upper canine					lower canine				
		max. lab. trans.	lab. height	max. lin. trans.	lin. height	lab.-lin. breadth	lab. height	lin. height	max. A.-P. dim.	lab.-lin. breadth	index	lab. height	lin. height	max. A.-P. dim.	lab.-lin. breadth	index
young adults	mean	85·25	114·00	84·00	120·50	—	200·56	200·70	—	—	—	—	—	—	—	—
	no. of animals	4	4	4	4	—	5	5	—	—	—	—	—	—	—	—
	S.D.	9·63	17·55	7·94	15·39	—	41·57	33·89	—	—	—	—	—	—	—	—
	S.E. of mean	3·40	6·21	2·81	5·44	—	13·85	10·72	—	—	—	—	—	—	—	—
old adults	mean	77·20	86·21	76·05	107·68	—	185·20	189·13	—	—	—	—	—	—	—	—
	no. of animals	11	10	11	10	—	10	10	—	—	—	—	—	—	—	—
	S.D.	11·81	25·32	13·01	20·74	—	33·35	25·21	—	—	—	—	—	—	—	—
	S.E. of mean	2·64	5·81	2·91	4·76	—	8·61	6·51	—	—	—	—	—	—	—	—
young and old adults grouped	mean	—	—	—	—	90·44	—	—	135·76	109·11	81·05	177·40	169·76	114·21	121·59	108·41
	no. of animals	—	—	—	—	14	—	—	22	22	22	14	14	19	19	19
	S.D.	—	—	—	—	6·98	—	—	19·82	17·00	16·33	37·33	30·13	20·68	22·05	26·75
	S.E. of mean	—	—	—	—	1·34	—	—	3·22	2·76	2·65	7·47	6·03	3·55	3·78	4·59

		upper first premolar			upper second premolar			lower first premolar			lower second premolar		
		A.-P. length	max. breadth	index	A.-P. length	max. breadth	index	A.-P. length	max. breadth	index	A.-P. length	max. breadth	index
young and old adults grouped	mean	78·91	101·07	128·49	74·82	100·84	135·16	103·17	82·03	79·94	79·09	86·76	110·30
	no. of animals	25	25	25	25	25	25	18	18	18	17	17	17
	S.D.	6·83	6·95	13·65	6·47	6·80	8·96	9·44	12·30	15·90	9·64	8·07	11·47
	S.E. of mean	1·01	1·04	2·04	0·96	1·01	1·34	1·60	2·08	2·69	1·68	1·41	2·00

		upper first molar						upper second molar						upper third molar					
		A.-P. length	trigone breadth	talon breadth	max. breadth	trigone index	talon index	A.-P. length	trigone breadth	talon breadth	max. breadth	trigone index	talon index	A.-P. length	trigone breadth	talon breadth	max. breadth	trigone index	talon index
young and old adults grouped	mean	102·57	113·87	109·11	114·15	111·22	106·59	102·43	116·39	107·70	116·43	113·77	105·43	93·43	107·23	100·97	108·61	115·13	107·68
	no. of animals	25	25	25	25	25	25	24	24	24	24	24	24	21	21	20	20	21	20
	S.D.	6·98	7·30	6·06	6·94	7·83	7·56	6·24	6·98	6·48	6·92	7·37	7·15	8·83	8·44	9·72	5·80	10·10	10·89
	S.E. of mean	1·03	1·08	0·89	1·02	1·15	1·12	0·94	1·05	0·98	1·04	1·11	1·08	1·40	1·34	1·58	0·94	1·60	1·77

		lower first molar						lower second molar						lower third molar					
		A.-P. length	trigonid breadth	talonid breadth	max. breadth	trigonid index	talonid index	A.-P. length	trigonid breadth	talonid breadth	max. breadth	trigond index	talonid index	A.-P. length	trigonid breadth	talonid breadth	max. breadth	trigonid index	talonid index
young and old adults grouped	mean	108·43	95·94	97·56	98·42	88·86	90·37	110·30	104·03	104·35	105·59	94·48	94·97	103·82	99·00	95·91	99·51	95·67	92·61
	no. of animals	19	19	19	19	19	19	18	18	18	18	18	18	18	19	19	19	18	18
	S.D.	8·89	8·54	7·97	8·52	7·84	8·28	7·89	9·26	8·53	8·87	7·53	8·39	8·98	6·82	9·30	6·56	7·30	6·81
	S.E. of mean	1·50	1·42	1·33	1·42	1·33	1·40	1·37	1·59	1·46	1·52	1·31	1·46	1·56	1·15	1·57	1·11	1·27	1·19

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Table 3. Female chimpanzee

		upper first incisor					upper second incisor					lower first incisor				
		max. lab. trans.	lab. height	max. lin. trans.	lin. height	lab.-lin. breadth	max. lab. trans.	lab. height	max. lin. trans.	lin. height	lab.-lin. breadth	max. lab. trans.	lab. height	max. lin. trans.	lin. height	lab.-lin. breadth
young adults	mean	113·20	104·60	108·20	111·70	—	88·10	98·60	87·20	105·50	—	79·33	98·67	78·44	109·22	—
	no. of animals	5	5	5	5	—	5	5	5	5	—	5	5	5	5	—
	S.D.	7·19	8·83	7·12	7·16	—	6·48	5·34	4·72	7·76	—	3·81	11·06	4·36	7·98	—
	S.E. of mean	2·28	2·79	2·25	2·26	—	2·05	1·69	1·49	2·46	—	1·27	3·69	1·45	2·66	—
old adults	mean	98·57	78·64	103·56	101·56	—	81·82	73·67	81·86	94·88	—	67·53	74·29	70·85	91·60	—
	no. of animals	8	6	5	5	—	7	6	4	5	—	10	9	8	8	—
	S.D.	18·48	34·71	14·07	19·18	—	10·27	19·34	13·54	14·67	—	11·03	24·53	14·20	16·64	—
	S.E. of mean	4·94	10·47	4·69	6·39	—	3·10	6·45	5·12	5·19	—	2·85	5·95	3·94	4·30	—
young and old adults grouped	mean	—	—	—	—	87·54	—	—	—	—	79·41	—	—	—	—	81·48
	no. of animals	—	—	—	—	13	—	—	—	—	13	—	—	—	—	15
	S.D.	—	—	—	—	11·93	—	—	—	—	9·93	—	—	—	—	9·53
	S.E. of mean	—	—	—	—	2·43	—	—	—	—	2·12	—	—	—	—	1·83

		lower second incisor					upper canine					lower canine				
		max. lab. trans.	lab. height	max. lin. trans.	lin. height	lab.-lin. breadth	lab. height	lin. height	max. A.-P. dim.	lab.-lin. breadth	index	lab. height	lin. height	max. A.-P. dim.	lab.-lin. breadth	index
young adults	mean	81·44	102·90	80·25	110·40	—	146·83	149·58	—	—	—	—	—	—	—	—
	no. of animals	6	6	6	6	—	7	7	—	—	—	—	—	—	—	—
	S.D.	10·91	12·40	9·75	11·81	—	19·98	20·70	—	—	—	—	—	—	—	—
	S.E. of mean	3·64	3·92	3·45	3·73	—	5·77	5·98	—	—	—	—	—	—	—	—
old adults	mean	73·20	81·19	76·82	92·79	—	119·36	124·00	—	—	—	—	—	—	—	—
	no. of animals	10	9	7	8	—	7	7	—	—	—	—	—	—	—	—
	S.D.	10·29	13·93	9·04	10·85	—	17·24	14·50	—	—	—	—	—	—	—	—
	S.E. of mean	2·66	3·48	2·73	2·90	—	5·20	4·37	—	—	—	—	—	—	—	—
young and old adults grouped	mean	—	—	—	—	81·71	—	—	112·56	89·85	80·26	126·73	118·85	88·74	93·87	109·19
	no. of animals	—	—	—	—	16	—	—	16	16	16	14	14	17	17	17
	S.D.	—	—	—	—	13·60	—	—	15·64	10·00	9·28	31·80	25·69	23·38	12·48	27·64
	S.E. of mean	—	—	—	—	2·57	—	—	3·01	1·93	1·79	6·24	5·04	4·20	2·24	4·97

		upper first premolar			upper second premolar			lower first premolar			lower second premolar		
		A.-P. length	max. breadth	index	A.-P. length	max. breadth	index	A.-P. length	max. breadth	index	A.-P. length	max. breadth	index
young and old adults grouped	mean	74·85	95·13	127·67	71·28	94·97	134·14	91·77	74·00	81·51	76·69	78·31	102·31
	no. of animals	20	20	20	17	17	17	18	18	18	17	17	17
	S.D.	8·86	9·80	13·16	8·03	11·18	8·63	15·34	17·24	21·08	8·44	11·71	14·08
	S.E. of mean	1·42	1·57	2·11	1·49	2·04	1·60	2·59	2·92	3·56	1·49	2·07	2·49

		upper first molar						upper second molar						upper third molar					
		A.-P. length	trigone breadth	talon breadth	max. breadth	trigone index	talon index	A.-P. length	trigone breadth	talon breadth	max. breadth	trigone index	talon index	A.-P. length	trigone breadth	talon breadth	max. breadth	trigone index	talon index
young and old adults grouped	mean	97·43	107·76	104·56	108·17	110·84	107·17	97·29	110·06	102·88	110·30	112·94	105·64	91·86	106·54	97·57	106·61	116·61	106·82
	no. of animals	20	20	20	20	20	20	18	18	18	18	18	18	16	16	16	16	16	16
	S.D.	12·63	12·54	9·97	12·14	7·43	7·27	10·82	14·06	10·98	13·60	10·96	7·24	10·93	12·86	9·22	12·95	15·65	12·08
	S.E. of mean	2·08	2·06	1·66	2·02	1·22	1·21	1·86	2·45	1·91	2·37	1·91	1·26	2·07	2·43	1·74	2·45	2·96	2·28

		lower first molar						lower second molar						lower third molar					
		A.-P. length	trigonid breadth	talonid breadth	max. breadth	trigonid index	talonid index	A.-P. length	trigonid breadth	talonid breadth	max. breadth	trigonid index	talonid index	A.-P. length	trigonid breadth	talonid breadth	max. breadth	trigonid index	talonid index
young and old adults grouped	mean	101·30	89·97	91·09	91·78	89·03	89·91	105·82	97·97	96·09	98·64	92·64	90·88	101·61	96·07	91·82	96·46	94·68	90·32
	no. of animals	18	18	18	18	18	18	18	18	18	18	18	18	14	14	14	14	14	14
	S.D.	10·24	8·51	10·25	9·46	6·11	4·84	10·34	11·70	11·23	11·60	7·36	6·15	10·98	12·94	13·21	13·02	7·13	7·28
	S.E. of mean	1·78	1·50	1·78	1·67	1·08	0·84	1·80	2·04	1·96	2·02	1·28	1·07	2·08	2·45	2·50	2·46	1·35	1·38

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Table 4. Male gorilla

		upper first incisor					upper second incisor					lower first incisor				
		max. lab. trans.	lab. height	max. lin. trans.	lin. height	lab.-lin. breadth	max. lab. trans.	lab. height	max. lin. trans.	lin. height	lab.-lin. breadth	max. lab. trans.	lab. height	max. lin. trans.	lin. height	lab.-lin. breadth
young adults	mean	140·00	132·65	137·50	126·40	115·25	106·40	121·10	101·95	127·15	107·00	84·00	119·53	85·88	121·65	102·47
	no. of animals	11	11	11	11	11	11	11	11	11	11	10	10	10	10	10
	S.D.	17·46	13·10	17·46	22·43	8·51	13·99	20·15	15·22	20·76	14·17	8·85	16·68	9·48	15·35	12·54
	S.E. of mean	3·91	2·93	3·91	5·02	1·90	3·13	4·51	3·40	4·64	3·17	2·15	4·05	2·30	3·72	3·04
old adults	mean	124·45	102·07	120·73	118·33	105·70	88·84	102·50	93·88	122·94	101·50	71·35	78·20	73·73	99·40	94·47
	no. of animals	12	9	9	9	12	15	11	10	10	14	9	8	8	8	10
	S.D.	24·69	26·40	26·66	22·86	20·78	13·72	22·00	8·53	22·00	14·49	9·62	23·20	16·03	17·63	10·67
	S.E. of mean	5·52	6·82	6·88	5·90	4·65	2·74	5·18	2·07	5·34	2·96	2·33	5·99	4·14	4·55	2·45
young and old adults grouped	mean	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	no. of animals	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	S.D.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	S.E. of mean	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

		lower second incisor					upper canine					lower canine				
		max. lab. trans.	lab. height	max. lin. trans.	lin. height	lab.-lin. breadth	lab. height	lin. height	max. A.-P. dim.	lab.-lin. breadth	index	lab. height	lin. height	max. A.-P. dim.	lab.-lin. breadth	index
young adults	mean	98·69	145·56	97·81	143·44	115·50	321·75	302·50	—	—	—	284·38	270·19	—	—	—
	no. of animals	9	9	9	9	9	9	8	—	—	—	9	9	—	—	—
	S.D.	10·12	10·04	10·48	10·63	10·13	70·37	33·51	—	—	—	47·86	39·63	—	—	—
	S.E. of mean	2·53	2·51	2·62	2·66	2·53	17·59	8·96	—	—	—	11·97	9·91	—	—	—
old adults	mean	85·67	105·63	86·29	127·41	109·18	265·40	279·87	—	—	—	235·83	230·57	—	—	—
	no. of animals	12	11	9	9	12	18	18	—	—	—	13	13	—	—	—
	S.D.	12·09	23·52	10·74	31·12	14·36	66·58	54·99	—	—	—	56·34	56·79	—	—	—
	S.E. of mean	2·64	5·40	2·61	7·55	3·06	12·15	10·04	—	—	—	11·75	11·84	—	—	—
young and old adults grouped	mean	—	—	—	—	—	—	—	206·95	163·64	79·27	—	—	145·47	179·17	124·06
	no. of animals	—	—	—	—	—	—	—	30	30	30	—	—	25	25	25
	S.D.	—	—	—	—	—	—	—	34·07	24·93	9·86	—	—	25·99	26·95	17·26
	S.E. of mean	—	—	—	—	—	—	—	4·55	3·36	1·33	—	—	3·79	3·93	2·52

		upper first premolar			upper second premolar			lower first premolar			lower second premolar		
		A.-P. length	max. breadth	index	A.-P. length	max. breadth	index	A.-P. length	max. breadth	index	A.-P. length	max. breadth	index
young and old adults grouped	mean	114·04	158·24	139·33	111·90	154·52	138·03	154·29	126·84	82·78	122·09	130·40	107·11
	no. of animals	35	35	35	35	35	35	29	26	26	29	29	29
	S.D.	12·88	17·20	14·70	11·09	16·49	13·08	16·62	29·69	19·35	12·58	13·10	10·08
	S.E. of mean	1·57	2·09	1·80	1·34	2·03	1·61	2·22	4·20	2·74	1·67	1·73	1·34

		upper first molar						upper second molar						upper third molar					
		A.-P. length	trigone breadth	talon breadth	max. breadth	trigone index	talon index	A.-P. length	trigone breadth	talon breadth	max. breadth	trigone index	talon index	A.-P. length	trigone breadth	talon breadth	max. breadth	trigone index	talon index
young and old adults grouped	mean	150·98	158·16	151·08	158·22	104·91	100·15	163·29	168·41	155·38	168·46	103·15	95·29	155·34	160·68	141·74	160·74	103·58	91·39
	no. of animals	35	35	35	35	35	35	34	35	35	35	34	34	33	31	31	31	31	31
	S.D.	13·70	15·52	15·50	15·48	7·74	6·59	16·42	17·46	15·18	17·46	5·53	6·19	17·90	16·97	16·45	16·92	8·79	8·81
	S.E. of mean	1·70	1·94	1·92	1·94	0·97	0·82	2·09	2·20	1·91	2·20	0·70	0·79	2·27	2·25	2·18	2·24	1·16	1·17

		lower first molar						lower second molar						lower third molar					
		A.-P length	trigonid breadth	talonid breadth	max. breadth	trigonid index	talonid index	A.-P. length	trigonid breadth	talonid breadth	max. breadth	trigonid index	talonid index	A.-P. length	trigonid breadth	talonid breadth	max. breadth	trigonid index	talonid index
young and old adults grouped	mean	160·74	137·67	136·59	139·05	85·54	85·00	178·83	157·19	152·46	157·93	87·88	85·37	176·53	153·75	141·13	153·71	86·53	79·58
	no. of animals	30	30	30	30	30	30	30	30	30	30	30	30	26	27	25	25	26	25
	S.D.	13·63	13·40	13·63	13·03	6·23	5·12	15·03	14·31	13·89	14·10	5·38	5·98	15·75	13·56	15·40	13·51	4·61	5·46
	S.E. of mean	1·79	1·78	1·79	1·73	0·83	0·67	1·96	1·86	1·81	1·84	0·70	0·78	2·30	1·96	2·27	2·01	0·69	0·81

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TABLE 5. FEMALE GORILLA

		upper first incisor					upper second incisor					lower first incisor				
		max. lab. trans.	lab. height	max. lin. trans.	lin. height	lab.-lin. breadth	max. lab. trans.	lab. height	max. lin. trans.	lin. height	lab.-lin. breadth	max. lab. trans.	lab. height	max. lin. trans.	lin. height	lab.-lin. breadth
young adults	mean	128·50	119·88	129·16	117·59	103·80	89·63	101·24	88·36	108·57	89·60	78·05	105·60	75·84	111·10	89·45
	no. of animals	10	9	10	9	10	13	13	13	12	13	10	10	10	10	10
	S.D.	24·49	22·46	20·56	13·18	12·56	20·79	30·81	20·57	24·50	15·48	11·12	22·83	9·67	18·77	9·59
	S.E. of mean	5·48	5·45	4·72	3·20	2·81	4·25	6·16	4·11	5·11	3·10	2·55	5·11	2·22	4·20	2·14
old adults	mean	110·58	62·50	108·64	97·60	91·50	82·83	68·67	83·93	94·29	81·28	63·43	60·00	63·00	79·58	81·00
	no. of animals	11	11	8	8	11	9	9	7	7	9	8	7	7	7	9
	S.D.	13·06	34·50	13·36	13·00	12·33	8·94	32·40	7·44	8·85	12·24	10·28	25·41	13·62	13·11	7·67
	S.E. of mean	3·00	7·71	3·57	3·36	2·76	2·11	7·64	1·99	2·37	2·89	2·75	7·33	3·93	3·79	1·98
young and old adults grouped	mean	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	no. of animals	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	S.D.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	S.E. of mean	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

		lower second incisor					upper canine					lower canine				
		max. lab. trans.	lab. height	max. lin. trans.	lin. height	lab.-lin. breadth	lab. height	lin. height	max. A.-P. dim.	lab.-lin. breadth	index	lab. height	lin. height	max. A.-P. dim.	lab.-lin. breadth	index
young adults	mean	88·84	123·00	88·21	128·37	101·00	164·73	176·36	—	—	—	161·60	155·67	—	—	—
	no. of animals	10	10	10	10	10	12	12	—	—	—	8	8	—	—	—
	S.D.	15·65	26·19	14·25	20·53	13·45	30·30	22·56	—	—	—	18·71	21·03	—	—	—
	S.E. of mean	3·59	6·01	3·27	4·71	3·09	6·46	4·81	—	—	—	4·83	5·43	—	—	—
old adults	mean	77·07	75·93	74·33	90·62	90·93	132·41	148·88	—	—	—	129·29	125·88	—	—	—
	no. of animals	8	8	7	7	8	10	10	—	—	—	9	9	—	—	—
	S.D.	15·67	37·55	18·15	12·48	10·40	33·16	26·77	—	—	—	25·98	17·41	—	—	—
	S.E. of mean	4·19	9·70	5·24	3·46	2·69	8·04	6·49	—	—	—	6·30	4·22	—	—	—
young and old adults grouped	mean	—	—	—	—	—	—	—	145·41	112·53	77·59	—	—	103·33	126·08	123·78
	no. of animals	—	—	—	—	—	—	—	23	23	23	—	—	18	18	18
	S.D.	—	—	—	—	—	—	—	14·44	9·83	6·98	—	—	21·31	17·73	24·66
	S.E. of mean	—	—	—	—	—	—	—	2·31	1·55	1·12	—	—	3·55	2·96	4·11

		upper first premolar			upper second premolar			lower first premolar			lower second premolar		
		A.-P. length	max. breadth	index	A.-P. length	max. breadth	index	A.-P. length	max. breadth	index	A.-P. length	max. breadth	index
young and old adults grouped	mean	106·86	142·73	134·47	102·90	140·74	137·72	138·76	117·33	85·11	114·71	119·70	104·93
	no. of animals	27	24	24	27	25	25	21	21	21	22	22	22
	S.D.	13·39	11·78	15·20	11·05	12·20	9·14	11·27	30·09	21·61	13·82	10·59	14·17
	S.E. of mean	1·87	1·76	2·27	1·55	1·80	1·35	1·83	4·82	3·51	2·16	1·68	2·24

		upper first molar						upper second molar						upper third molar					
		A.-P. length	trigone breadth	talon breadth	max. breadth	trigone index	talon index	A.-P. length	trigone breadth	talon breadth	max. breadth	trigone index	talon index	A.-P. length	trigone breadth	talon breadth	max. breadth	trigone index	talon index
young and old adults grouped	mean	140·74	143·57	137·13	143·60	102·13	97·75	149·60	152·79	142·02	153·67	102·21	95·14	135·82	142·90	126·00	143·81	105·32	92·25
	no. of animals	28	28	27	27	28	27	27	27	26	26	27	26	21	20	19	19	20	19
	S.D.	12·56	12·33	11·95	12·61	6·63	6·47	14·99	15·43	14·71	14·65	7·34	9·12	13·55	13·84	15·05	12·99	8·68	9·12
	S.E. of mean	1·71	1·68	1·66	1·75	0·90	0·90	2·08	2·12	2·06	2·05	1·02	1·29	2·17	2·22	2·48	2·14	1·41	1·52

		lower first molar						lower second molar						lower third molar					
		A.-P. length	trigonid breadth	talonid breadth	max. breadth	trigonid index	talonid index	A.-P. length	trigonid breadth	talonid breadth	max. breadth	trigonid index	talonid index	A.-P. length	trigonid breadth	talonid breadth	max. breadth	trigonid index	talonid index
young and old adults grouped	mean	152·05	126·11	125·69	127·11	83·08	82·61	165·56	144·59	141·00	144·90	87·46	85·15	157·03	140·70	127·86	140·06	89·46	81·59
	no. of animals	21	21	21	21	20	21	21	21	21	21	21	21	19	19	18	18	19	18
	S.D.	11·88	11·34	10·84	10·81	3·65	3·89	14·78	12·25	10·67	12·51	3·27	3·19	14·63	11·17	11·97	10·42	7·09	6·60
	S.E. of mean	1·93	1·84	1·74	1·75	0·60	0·63	2·31	1·91	1·69	1·98	0·51	0·51	2·47	1·84	2·02	1·76	1·20	1·13

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TABLE 6. MALE ORANG-OUTANG

		upper first incisor					upper second incisor					lower first incisor				
		max. lab. trans.	lab. height	max. lin. trans.	lin. height	lab.-lin. breadth	max. lab. trans.	lab. height	max. lin. trans.	lin. height	lab.-lin. breadth	max. lab. trans.	lab. height	max. lin. trans.	lin. height	lab.-lin. breadth
young adults	mean	139·70	130·70	133·50	137·20	—	93·00	115·86	91·57	122·57	—	93·44	127·11	91·56	132·44	—
	no. of animals	5	5	5	5	—	4	4	4	4	—	5	5	5	5	—
	S.D.	17·70	25·37	13·77	25·11	—	7·48	21·15	7·70	15·39	—	7·83	31·34	7·55	29·28	—
	S.E. of mean	5·60	8·02	4·35	7·94	—	2·83	7·99	2·91	5·82	—	2·61	10·44	2·52	9·76	—
old adults	mean	126·93	97·67	123·14	142·20	—	86·76	88·14	86·63	111·33	—	85·48	96·64	85·15	131·76	—
	no. of animals	10	10	10	10	—	14	14	13	14	—	16	14	15	14	—
	S.D.	27·23	37·69	23·86	19·92	—	9·62	16·09	16·63	13·22	—	20·37	28·72	17·34	21·62	—
	S.E. of mean	7·28	9·73	6·38	5·15	—	2·10	3·51	3·82	2·89	—	3·78	5·74	3·40	4·32	—
young and old adults grouped	mean	—	—	—	—	122·00	—	—	—	—	89·93	—	—	—	—	104·00
	no. of animals	—	—	—	—	15	—	—	—	—	18	—	—	—	—	21
	S.D.	—	—	—	—	19·26	—	—	—	—	11·85	—	—	—	—	19·98
	S.E. of mean	—	—	—	—	3·85	—	—	—	—	2·24	—	—	—	—	3·29

		lower second incisor					upper canine					lower canine				
		max. lab. trans.	lab. height	max. lin. trans.	lin. height	lab.-lin. breadth	lab. height	lin. height	max. A.-P. dim.	lab.-lin. breadth	index	lab. height	lin. height	max. A.-P. dim.	lab.-lin. breadth	index
young adults	mean	94·50	138·30	90·20	141·10	—	—	—	—	—	—	—	—	—	—	—
	no. of animals	5	5	5	5	—	—	—	—	—	—	—	—	—	—	—
	S.D.	7·02	31·14	13·47	26·33	—	—	—	—	—	—	—	—	—	—	—
	S.E. of mean	2·22	9·85	4·26	8·32	—	—	—	—	—	—	—	—	—	—	—
old adults	mean	86·76	108·30	85·21	133·96	—	—	—	—	—	—	—	—	—	—	—
	no. of animals	17	15	16	15	—	—	—	—	—	—	—	—	—	—	—
	S.D.	17·37	25·69	12·77	24·78	—	—	—	—	—	—	—	—	—	—	—
	S.E. of mean	3·23	4·94	2·41	4·77	—	—	—	—	—	—	—	—	—	—	—
young and old adults grouped	mean	—	—	—	—	104·35	210·92	225·16	159·90	138·03	86·47	219·16	212·64	127·44	151·48	119·33
	no. of animals	—	—	—	—	22	14	14	17	17	17	15	15	16	16	16
	S.D.	—	—	—	—	13·19	57·58	58·23	18·24	19·92	11·45	56·92	35·56	14·45	14·55	10·69
	S.E. of mean	—	—	—	—	2·09	11·52	11·65	3·33	3·64	2·09	11·39	7·11	2·78	2·80	2·06

		upper first premolar			upper second premolar			lower first premolar			lower second premolar		
		A.-P. length	max. breadth	index	A.-P. length	max. breadth	index	A.-P. length	max. breadth	index	A.-P. length	max. breadth	index
young and old adults grouped	mean	100·26	130·44	130·89	96·83	131·46	136·30	131·50	114·27	88·18	116·42	114·44	98·67
	no. of animals	26	26	26	26	26	26	22	22	22	22	22	22
	S.D.	11·22	10·62	13·76	9·18	11·22	11·01	22·03	22·09	24·02	13·96	12·03	10·47
	S.E. of mean	1·66	1·58	2·05	1·33	1·62	1·61	3·32	3·33	3·62	2·13	1·83	1·60

		upper first molar						upper second molar						upper third molar					
		A.-P. length	trigone breadth	talon breadth	max. breadth	trigone index	talon index	A.-P. length	trigone breadth	talon breadth	max. breadth	trigone index	talon index	A.-P. length	trigone breadth	talon breadth	max. breadth	trigone index	talon index
young and old adults grouped	mean	121·51	136·45	133·47	136·69	112·73	110·27	122·28	141·96	128·14	141·96	116·52	105·30	116·36	138·60	120·67	139·02	120·32	103·29
	no. of animals	25	25	25	25	25	25	26	26	26	26	26	26	25	25	24	24	25	24
	S.D.	13·96	12·43	12·64	12·27	10·29	10·27	16·02	13·45	11·56	13·45	9·90	10·87	19·87	13·40	15·03	13·38	15·49	15·54
	S.E. of mean	1·99	1·78	1·81	1·75	1·47	1·47	2·27	1·90	1·64	1·90	1·40	1·54	2·90	1·95	2·24	1·99	2·26	2·32

		lower first molar						lower second molar						lower third molar					
		A.-P. length	trigonid breadth	talonid breadth	max. breadth	trigonid index	talonid index	A.-P. length	trigonid breadth	talonid breadth	max. breadth	trigonid index	talonid index	A.-P. length	trigonid breadth	talonid breadth	max. breadth	trigonid index	talonid index
young and old adults grouped	mean	130·91	119·70	119·74	120·98	91·53	91·63	136·93	129·14	126·33	129·98	94·48	92·38	138·35	124·68	118·28	125·10	90·38	85·60
	no. of animals	22	22	22	22	22	22	21	21	21	21	21	21	20	20	20	20	20	20
	S.D.	14·78	11·45	12·59	12·24	4·39	4·22	17·54	13·80	15·15	14·66	4·39	4·53	18·85	15·62	15·07	15·26	7·47	5·89
	S.E. of mean	2·25	1·75	1·92	1·87	0·67	0·64	2·71	2·13	2·34	2·26	0·68	0·70	2·98	2·47	2·38	2·41	1·18	0·93

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Table 7. Female orang-outang

		upper first incisor					upper second incisor					lower first incisor				
		max. lab. trans.	lab. height	max. lin. trans.	lin. height	lab.-lin. breadth	max. lab. trans.	lab. height	max. lin. trans.	lin. height	lab.-lin. breadth	max. lab. trans.	lab. height	max. lin. trans.	lin. height	lab.-lin. breadth
young adults	mean	136·50	145·40	135·38	149·90	—	87·22	108·56	86·33	114·00	—	88·57	118·43	87·14	133·71	—
	no. of animals	5	5	5	5	—	5	5	5	5	—	4	4	4	4	—
	S.D.	6·54	12·93	9·61	14·97	—	9·37	25·81	5·68	10·36	—	7·66	19·08	3·87	7·33	—
	S.E. of mean	2·31	4·09	3·40	4·73	—	3·12	8·60	1·89	3·46	—	2·90	7·21	1·46	2·77	—
old adults	mean	121·29	88·67	119·71	124·13	—	81·63	85·22	78·11	112·00	—	76·20	92·83	70·25	118·60	—
	no. of animals	4	5	4	4	—	5	5	5	4	—	4	4	3	3	—
	S.D.	5·20	45·85	5·39	6·71	—	8·43	18·95	5·39	10·03	—	6·95	40·25	2·55	20·96	—
	S.E. of mean	1·96	15·28	2·04	2·37	—	2·98	6·32	1·80	3·79	—	3·11	16·43	1·28	9·38	—
young and old adults grouped	mean	—	—	—	—	109·35	—	—	—	—	76·67	—	—	—	—	86·69
	no. of animals	—	—	—	—	10	—	—	—	—	10	—	—	—	—	8
	S.D.	—	—	—	—	10·82	—	—	—	—	7·22	—	—	—	—	9·02
	S.E. of mean	—	—	—	—	2·42	—	—	—	—	1·70	—	—	—	—	2·50

		lower second incisor					upper canine					lower canine				
		max. lab. trans.	lab. height	max. lin. trans.	lin. height	lab.-lin. breadth	lab. height	lin. height	max. A.-P. dim.	lab.-lin. breadth	index	lab. height	lin. height	max. A.-P. dim.	lab.-lin. breadth	index
young adults	mean	90·83	133·50	88·00	138·67	—	—	—	—	—	—	—	—	—	—	—
	no. of animals	4	4	4	4	—	—	—	—	—	—	—	—	—	—	—
	S.D.	7·87	8·19	3·61	2·08	—	—	—	—	—	—	—	—	—	—	—
	S.E. of mean	3·21	3·34	1·47	0·85	—	—	—	—	—	—	—	—	—	—	—
old adults	mean	77·50	110·14	75·00	125·20	—	—	—	—	—	—	—	—	—	—	—
	no. of animals	4	4	4	3	—	—	—	—	—	—	—	—	—	—	—
	S.D.	8·23	39·16	7·44	14·89	—	—	—	—	—	—	—	—	—	—	—
	S.E. of mean	3·36	14·80	3·04	6·66	—	—	—	—	—	—	—	—	—	—	—
young and old adults grouped	mean	—	—	—	—	91·92	144·32	146·16	124·70	94·95	76·35	149·82	155·60	84·00	110·42	130·91
	no. of animals	—	—	—	—	8	11	11	11	11	11	9	8	8	9	8
	S.D.	—	—	—	—	4·29	31·45	21·84	11·18	10·26	8·71	22·07	15·46	9·64	18·32	24·61
	S.E. of mean	—	—	—	—	1·19	7·21	5·01	2·50	2·29	1·95	6·65	4·89	2·91	5·29	7·42

		upper first premolar			upper second premolar			lower first premolar			lower second premolar		
		A.-P. length	max. breadth	index	A.-P. length	max. breadth	index	A.-P. length	max. breadth	index	A.-P. length	max. breadth	index
young and old adults grouped	mean	90·17	116·54	129·96	88·15	120·20	136·36	111·80	99·75	90·45	102·60	104·05	102·05
	no. of animals	13	13	13	13	13	13	10	10	10	10	10	10
	S.D.	8·61	7·28	12·43	6·71	5·97	8·90	17·60	14·04	21·20	11·82	9·66	10·47
	S.E. of mean	1·79	1·49	2·59	1·32	1·19	1·78	3·94	3·14	4·74	2·64	2·16	2·34

		upper first molar						upper second molar						upper third molar					
		A.-P. length	trigone breadth	talon breadth	max. breadth	trigone index	talon index	A.-P. length	trigone breadth	talon breadth	max. breadth	trigone index	talon index	A.-P. length	trigone breadth	talon breadth	max. breadth	trigone index	talon index
young and old adults grouped	mean	115·27	124·08	119·65	124·42	107·81	103·85	113·96	130·00	115·08	130·00	114·27	101·15	104·52	123·83	106·00	123·83	118·65	101·61
	no. of animals	13	13	13	13	13	13	13	13	13	13	13	13	13	12	12	12	12	12
	S.D.	6·74	8·00	8·59	7·40	6·60	6·75	9·82	9·80	9·75	9·80	7·16	8·77	11·86	9·12	9·23	9·12	9·14	9·09
	S.E. of mean	1·32	1·57	1·69	1·45	1·29	1·32	1·93	1·92	1·91	1·92	1·40	1·72	2·37	1·90	1·93	1·90	1·91	1·89

		lower first molar						lower second molar						lower third molar					
		A.-P. length	trigonid breadth	talonid breadth	max. breadth	trigonid index	talonid index	A.-P. length	trigonid breadth	talonid breadth	max. breadth	trigonid index	talonid index	A.-P. length	trigonid breadth	talonid breadth	max. breadth	trigonid index	talonid index
young and old adults grouped	mean	122·26	110·90	109·53	112·18	90·89	90·13	125·20	118·05	114·10	118·35	94·50	91·30	123·95	111·65	105·21	111·74	90·60	85·79
	no. of animals	10	10	9	9	10	9	10	10	10	10	10	10	10	10	10	10	10	10
	S.D.	10·17	7·40	6·29	7·14	5·69	6·23	10·03	7·95	8·45	7·94	6·27	5·54	10·55	8·69	8·84	8·67	8·90	9·08
	S.E. of mean	2·33	1·66	1·52	1·73	1·31	1·56	2·24	1·78	1·89	1·78	1·40	1·24	2·36	1·94	2·03	1·99	1·99	2·08

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Description of plate 26

All photographs have been reproduced $\frac{4}{3}$ natural size

Figure 1. Labial view of left maxillary incisors and canine of female gorilla.
Figure 2. Lingual view of right maxillary incisors and canine of female gorilla.
Figure 3. Occlusal view of left maxillary incisors and canine of female gorilla.
Figure 4. Occlusal view of left maxillary molars and premolars of female gorilla.
Figure 5. Labial view of left mandibular incisors and canine of female gorilla.
Figure 6. Lingual view of right mandibular incisors and canine of female gorilla.
Figure 7. Occlusal view of left mandibular incisors and canine of female gorilla.
Figure 8. Occlusal view of right mandibular molars and premolars of female gorilla.

The arrows and broken lines indicate the measurements which were taken. For lettering see text.

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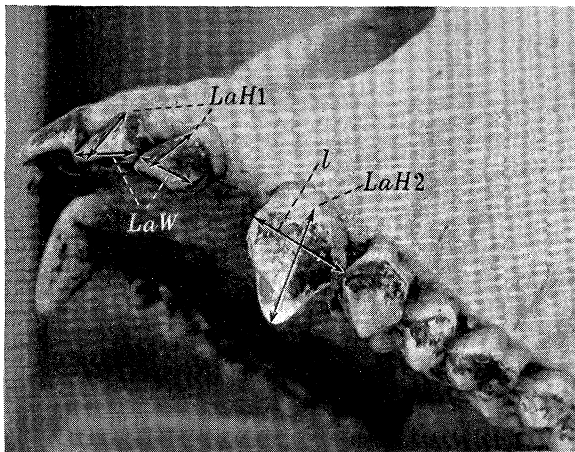

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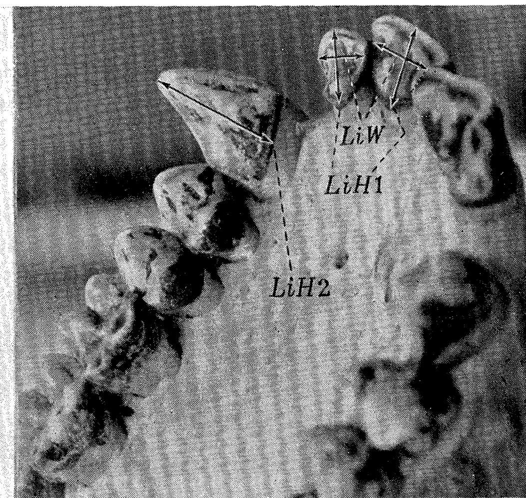

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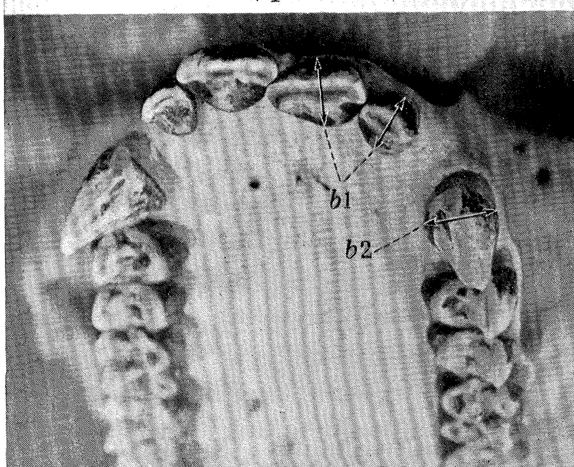

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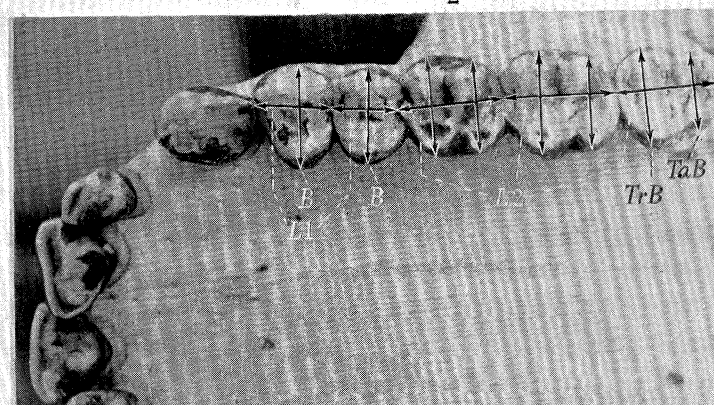

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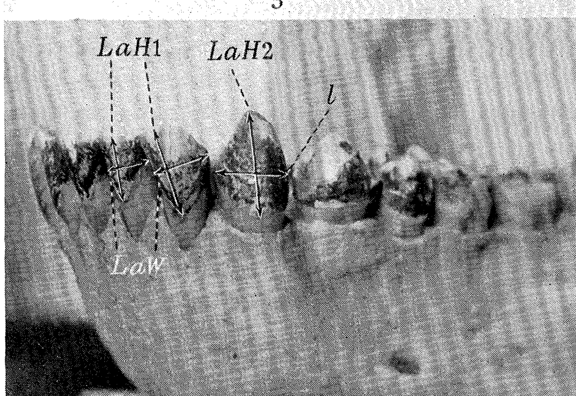

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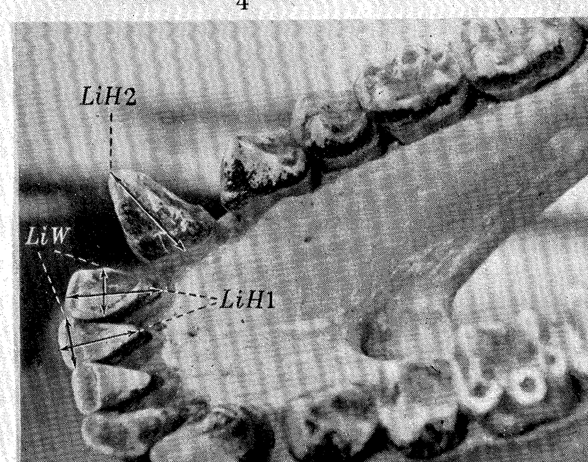

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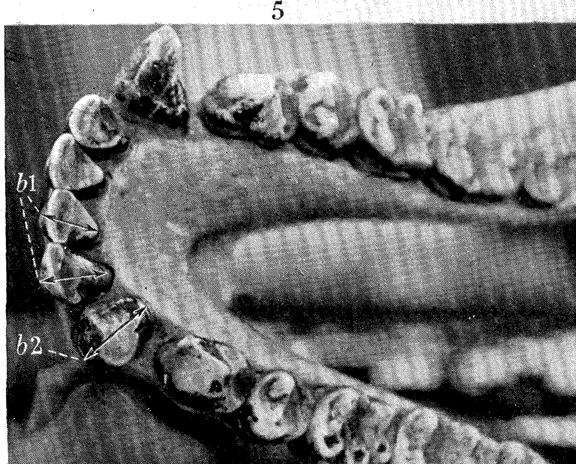

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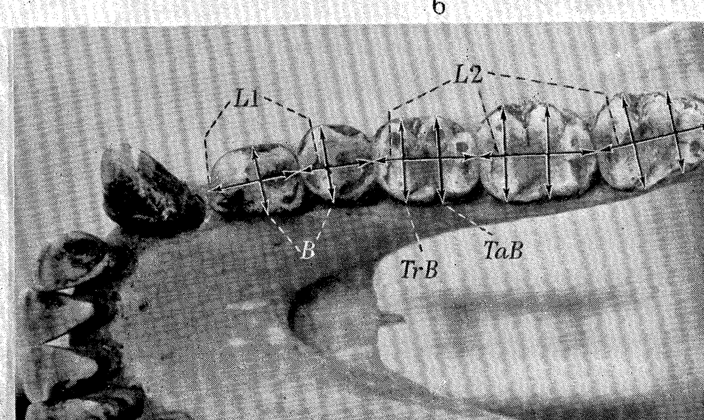

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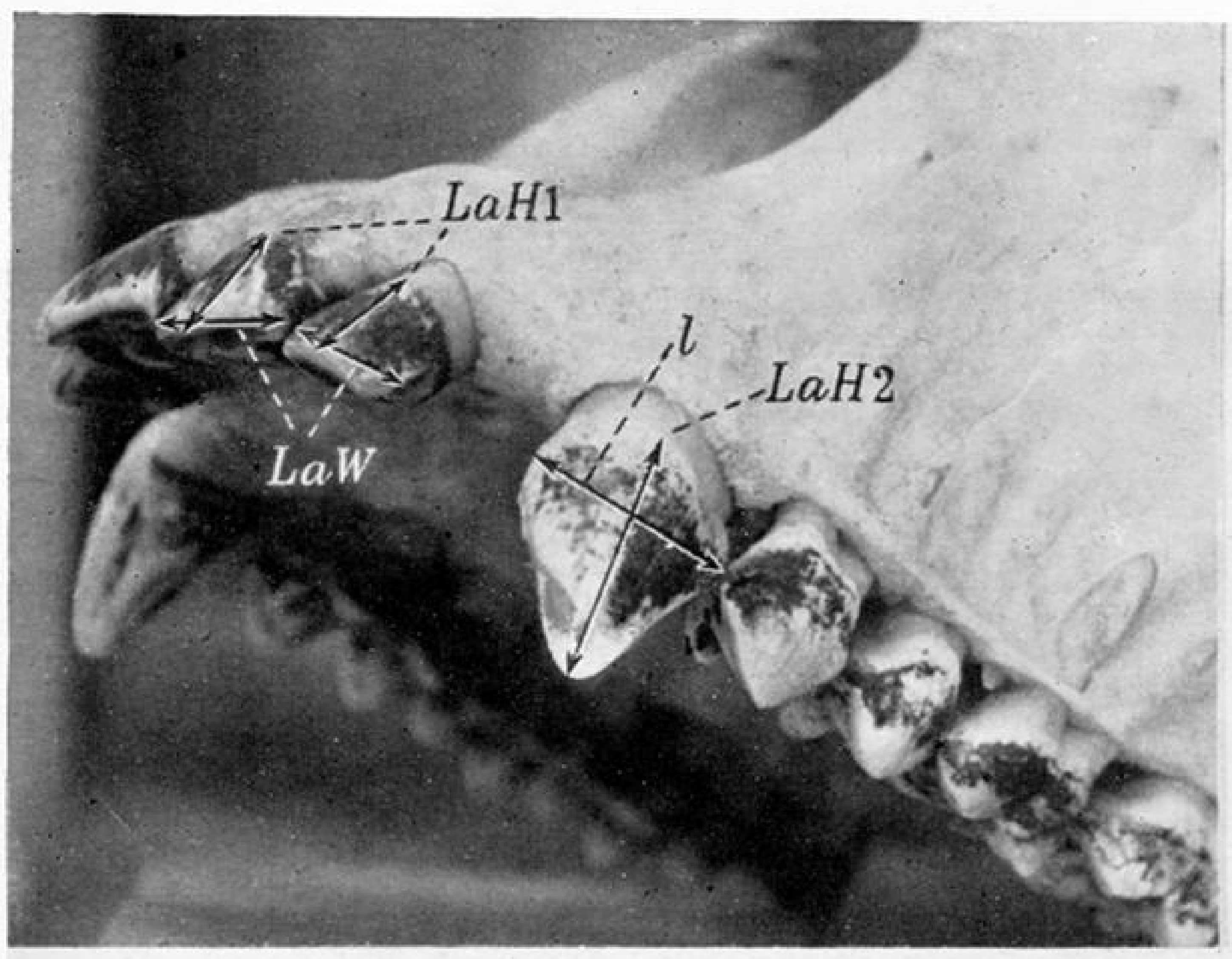

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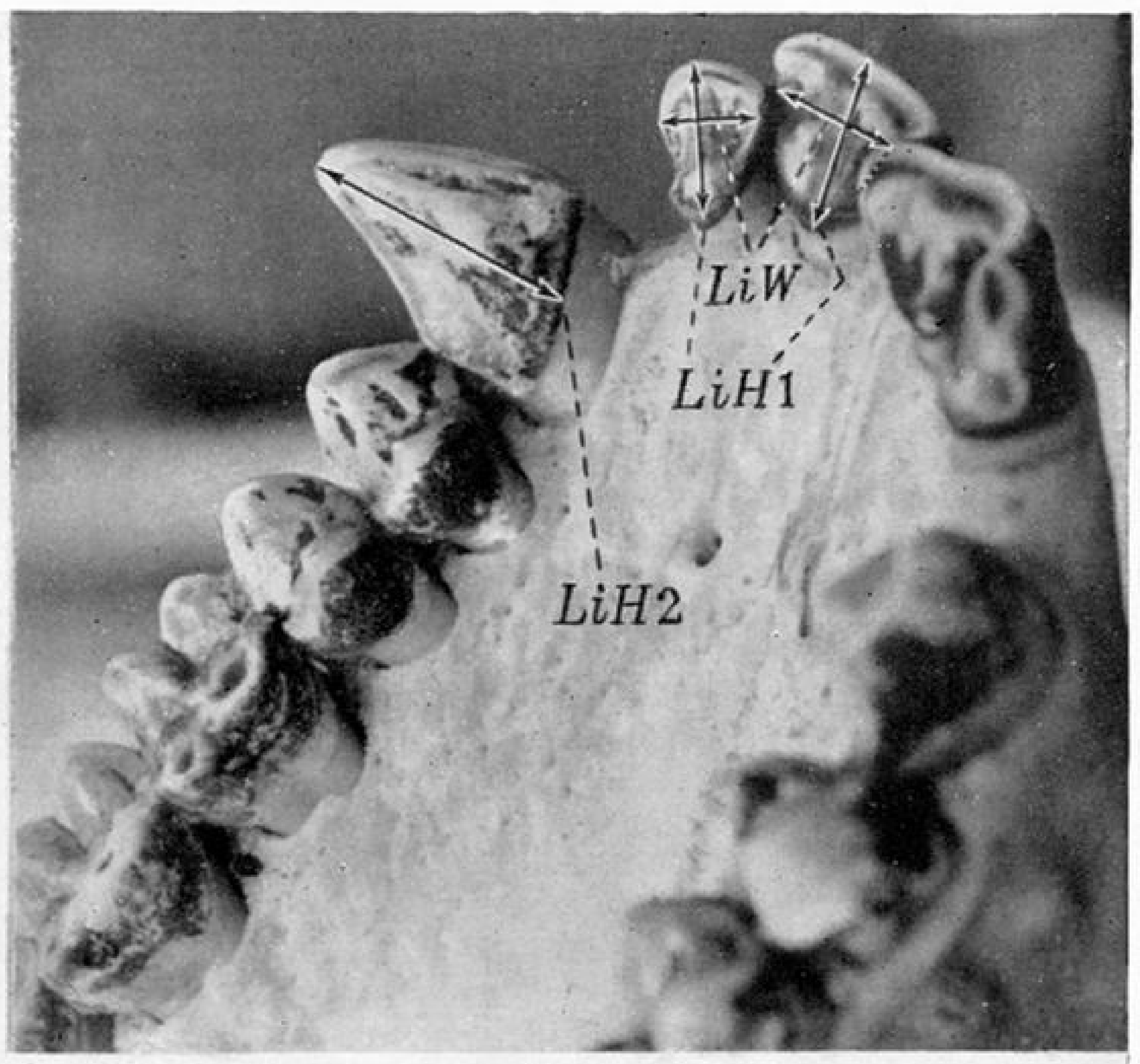

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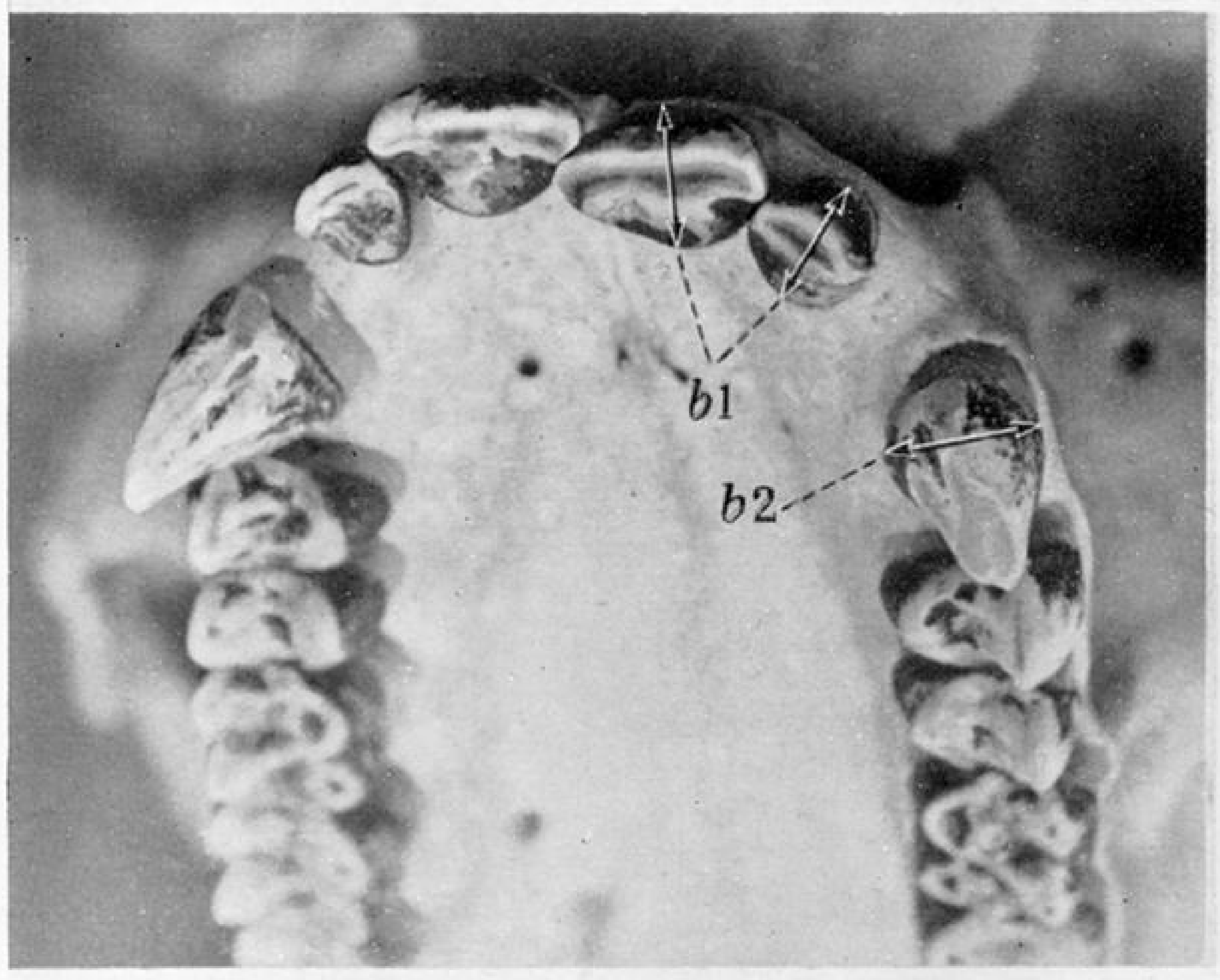

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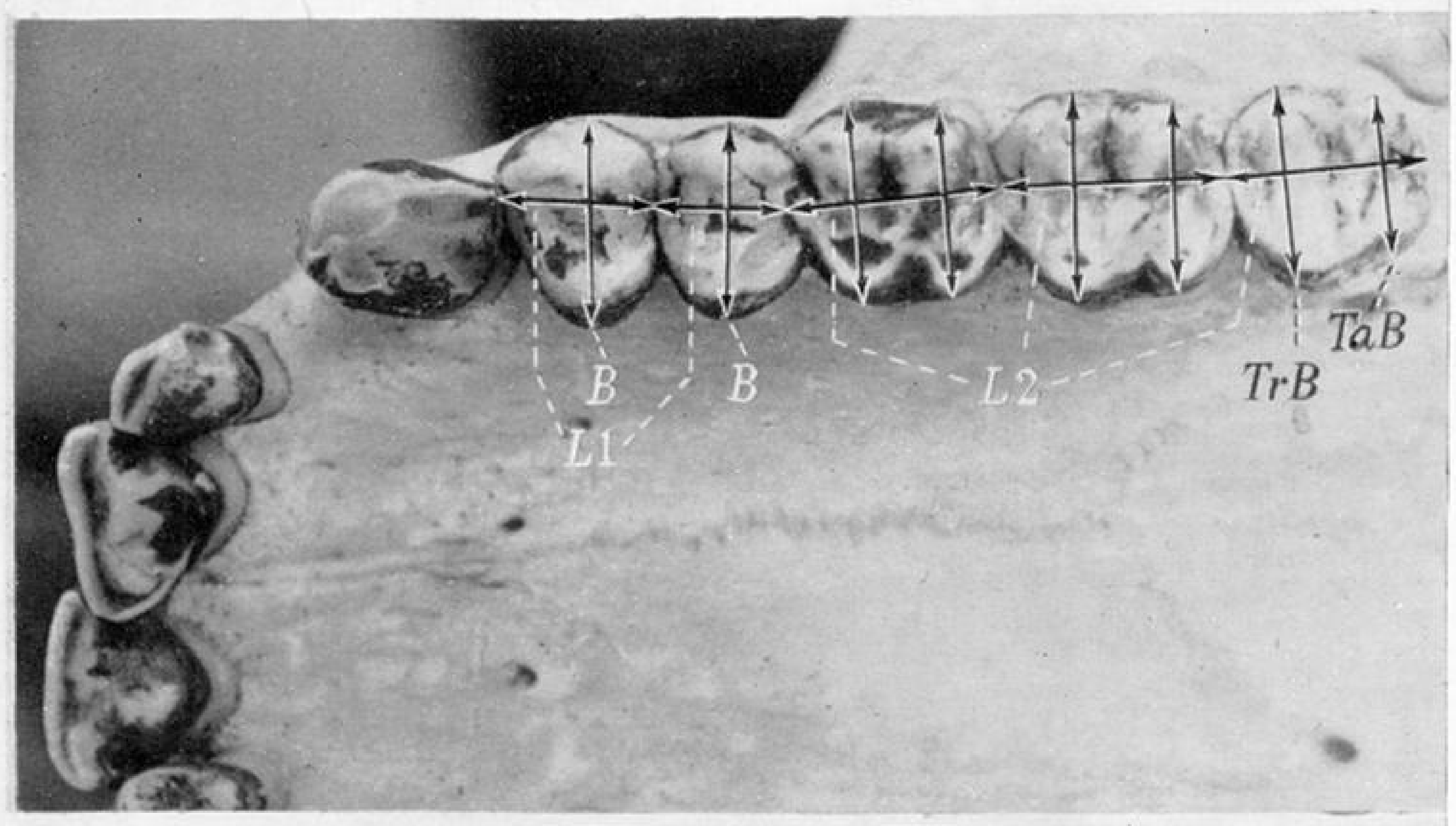

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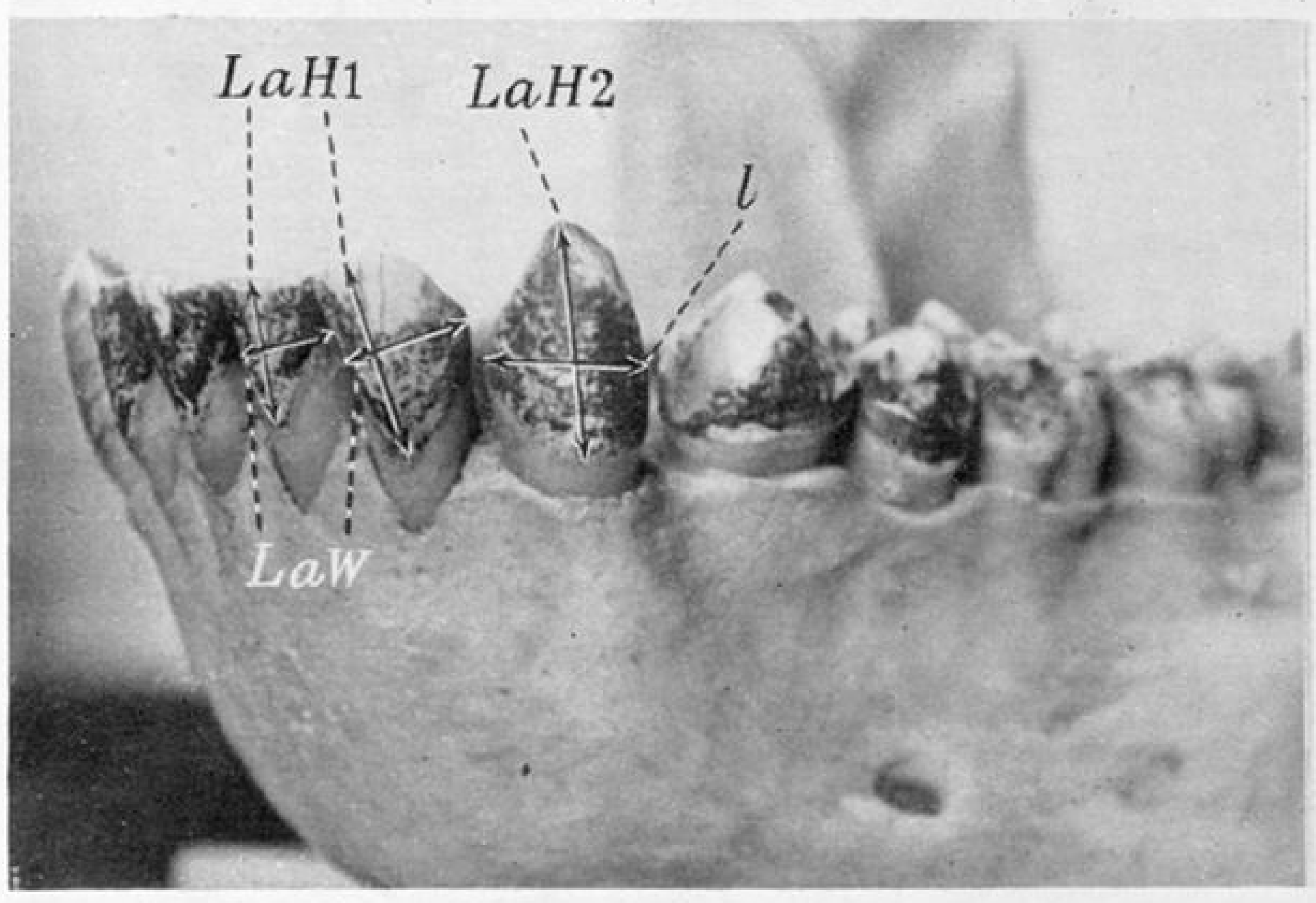

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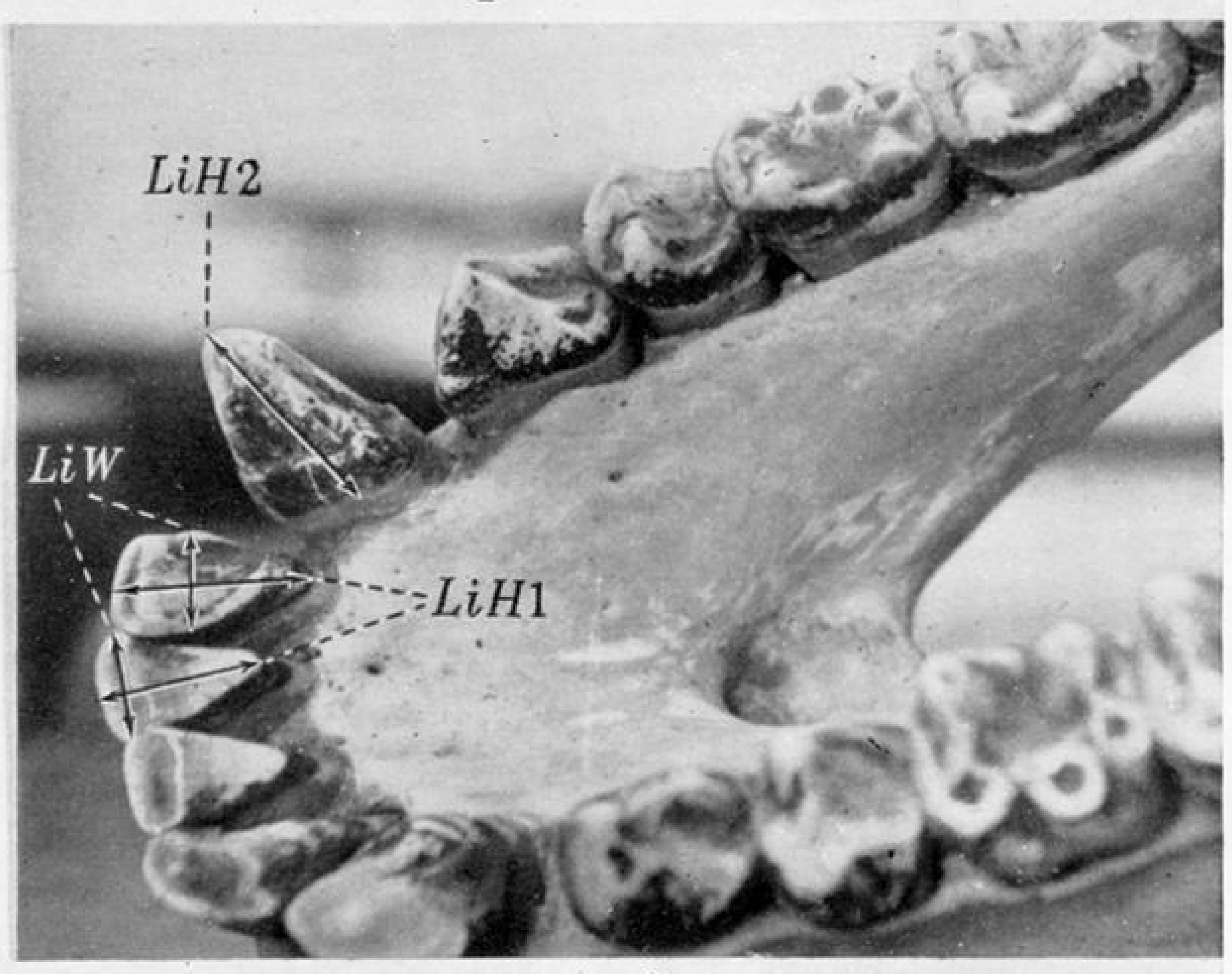

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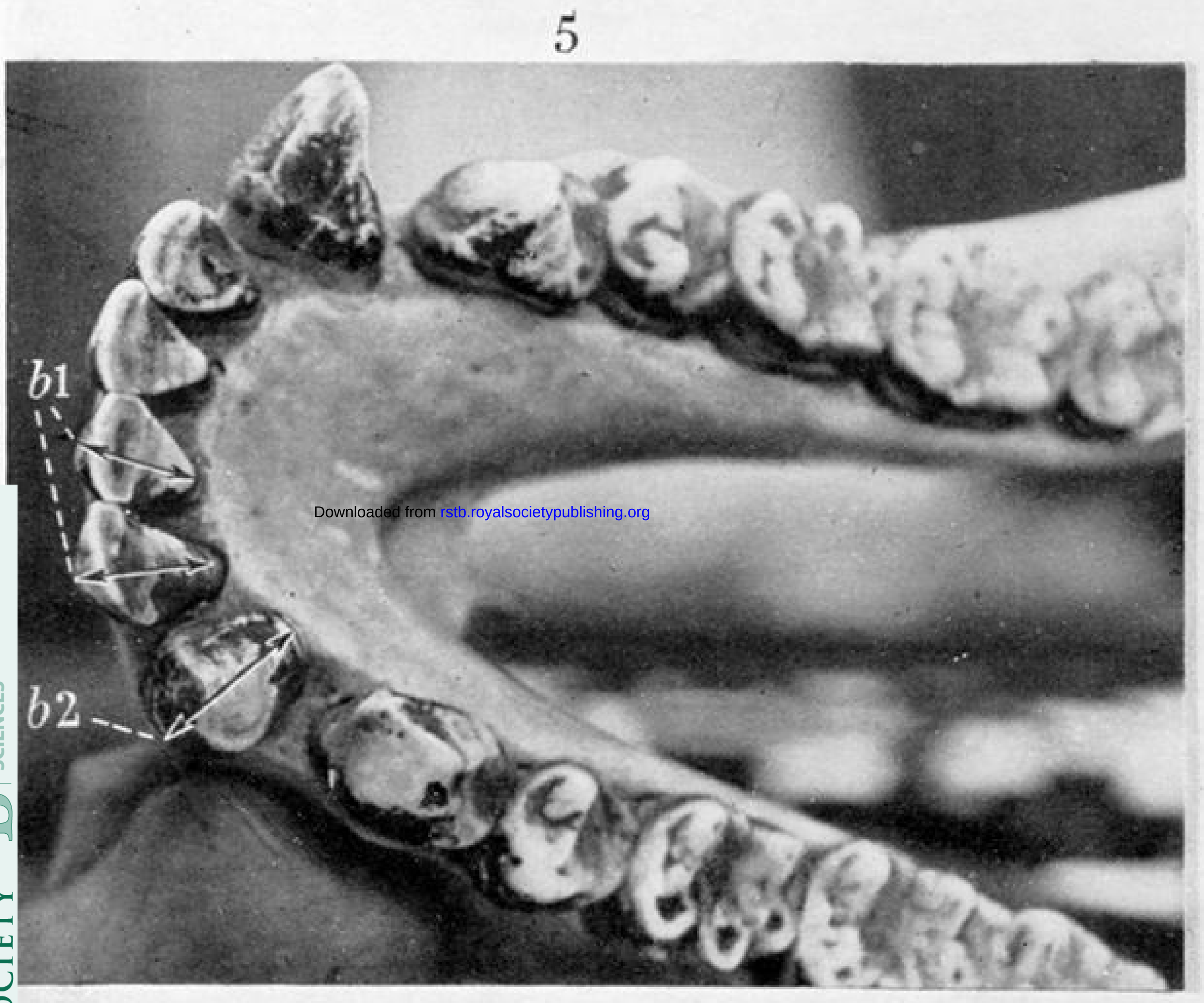

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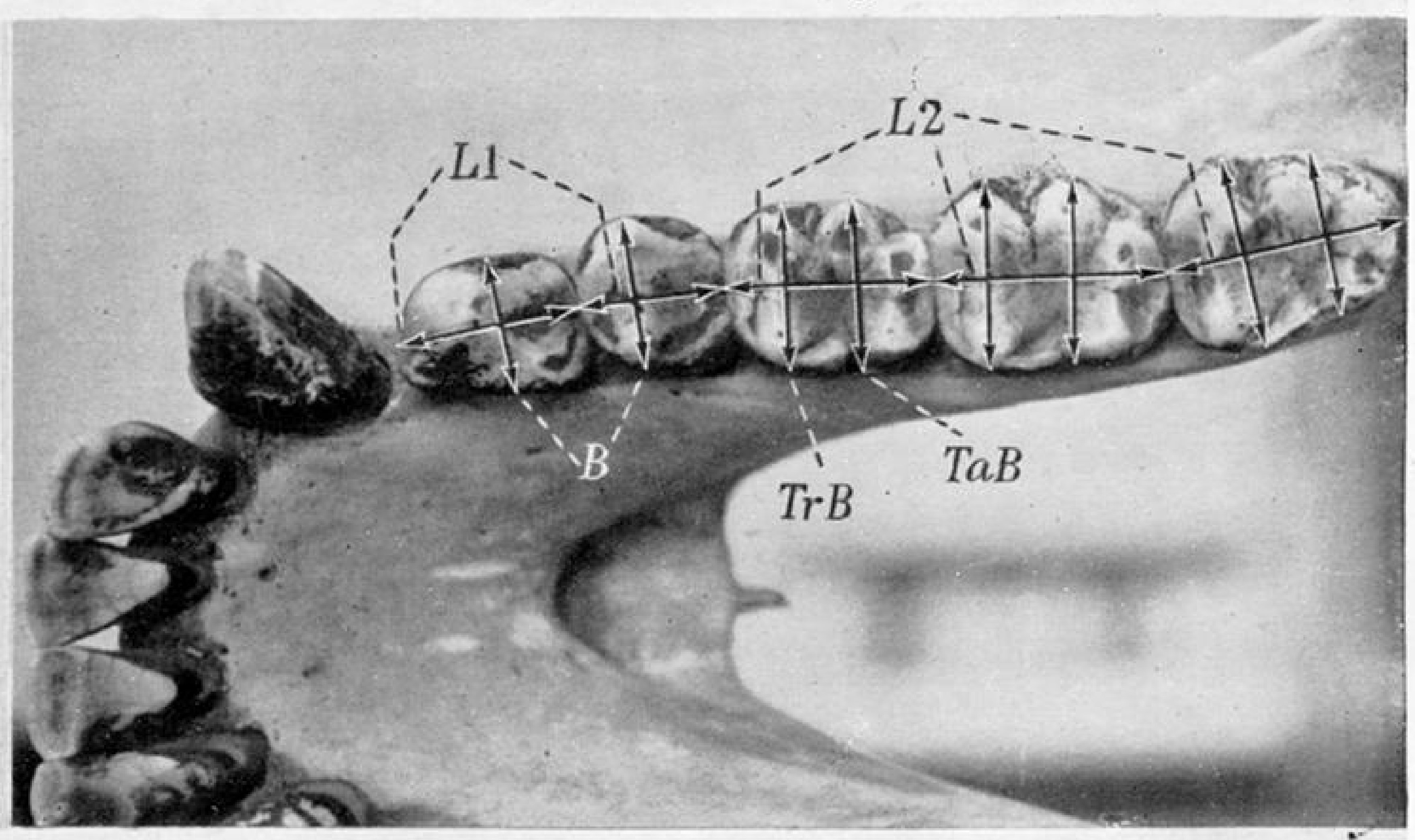

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Description of plate 26

All photographs have been reproduced $\frac{4}{3}$ natural size

Figure 1. Labial view of left maxillary incisors and canine of female gorilla.
Figure 2. Lingual view of right maxillary incisors and canine of female gorilla.
Figure 3. Occlusal view of left maxillary incisors and canine of female gorilla.
Figure 4. Occlusal view of left maxillary molars and premolars of female gorilla.
Figure 5. Labial view of left mandibular incisors and canine of female gorilla.
Figure 6. Lingual view of right mandibular incisors and canine of female gorilla.
Figure 7. Occlusal view of left mandibular incisors and canine of female gorilla.
Figure 8. Occlusal view of right mandibular molars and premolars of female gorilla.

The arrows and broken lines indicate the measurements which were taken. For lettering see text.

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