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## HUMAN SKELETAL REMAINS FROM PLUM POINT AND BIO-TEMPORAL IDENTIFICATION IN ONTARIO PREHISTORY

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### ABSTRACT

Two individuals, one represented by a skull, a mandible, and some postcranial parts, the other by fragmentary jaws and teeth, were collected around the turn of the century from a site on the Lower Rideau Lake in eastern Ontario and stored in the Perth Museum. Artifacts in the museum suggested a late Initial Woodland Period temporal affiliation but original documents did not indicate that the artifacts were actually collected with the bones. Osteological tests based on comparative cranial morphology and dental pathology tend to support the temporal assignment suggested by the artifacts. The tests are founded on earlier perceived morphological dichotomies between Initial Woodland and later populations of Ontario and on an apparent pattern of seriation in the incidence of dental caries related to temporal change in these populations from a subsistence based on hunting and gathering to one based on agriculture.

### INTRODUCTION

Plum Point is on the west bank of Lower Rideau Lake in eastern Ontario, at **44° 52' 25" N**, **76° 07' 00" W**, 1.5 km south of Port Elmsley and 10 km east-southeast of Perth. In connection with a recent survey of the site, BfGa-2 in the Borden (1952) system, Gordon Watson (1976) investigated earlier archaeological collections in the Perth Museum and located some 90 items from Plum Point acquired around the turn of the century by W.L. McLaren. Among the materials were the skeletal remains of two individuals that Mr. Watson and the Perth Museum invited me to examine.

Central to the requirements of the study was an assessment of whether the skeletal remains might belong to the Initial Woodland period of Ontario prehistory. That assignment was hinted at by artifacts found with the bones in the museum, but the original records of the finds, made between 1896 and 1919, did not report that the artifacts were, in fact, collected with the bones.

This paper considers the question of temporal assignment from the standpoint of osteological analysis. The attempt is founded on suggested morphological dichotomies between Initial Woodland and later populations of Ontario largely demonstrated by J.E. Anderson's (1968) study of skeletal remains from the multicomponent Serpent Mounds site (BbGm-2) in Peterborough County. Also considered in the assessment is an element of dental pathology that has been suggested to seriate Ontario populations through time relative to their differences in subsistence (Anderson 1968; Cybulski 1968; Molto 1979). Inasmuch as human osteological data have not previously been reported for the Lower Rideau Lake region, the Plum Point skeletal morphology and pathology are described in detail.

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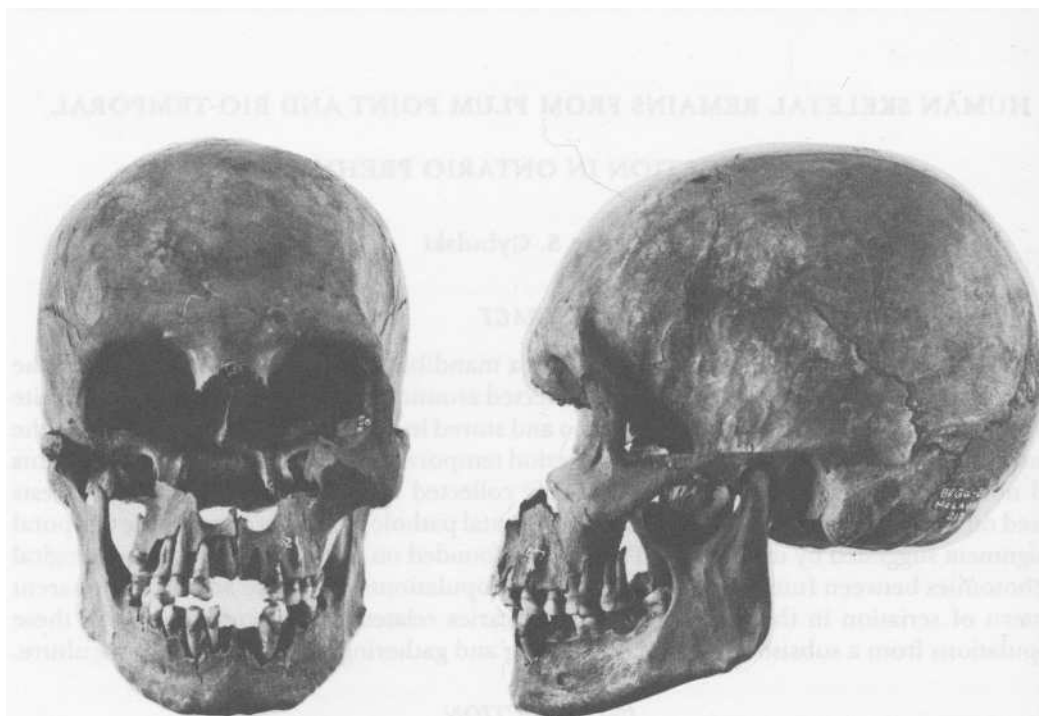


Fig. 1. Three views of Cranium No. 217.

*MATERIAL AND CONTEXT*

The skeletal remains of the two individuals are incomplete. One, catalogued No. 217, consists of an almost complete skull and mandible with 20 teeth, and nine postcranial parts including two ribs, an incomplete right scapula acromion process, a right patella, a distal half of right fibula, and four incomplete thoracic vertebrae. McLaren's catalogue entry described these remains as follows:

Indian skull from shoal leading from Plum Point proper to where the Tay River entered the Rideau Lake, Ont. This skull was not more than eight inches below the surface when found. The other bones were somewhat disarranged by the action of the water and ice but judging from the position of the bones I would say the body was buried in a sitting position facing Eastward. The earth filling the grave was composed largely of ashes and blackened sand. This was found by Cyril Inderwick and W.L. McL. Nov. 4th, 1919.

The second individual, catalogued No. 102, consists of fragmentary right and left maxilla parts, a fragment of the right mandible body, three small cranial vault fragments including a portion of temporal bone, 14 teeth, and an incomplete right fourth metacarpal. McLaren's catalogue entry referred to these parts as:

Fragments of skull and jaw bone with teeth - Dug up on shore of sand bar at north of Plum Point, Rideau Lake, Ont.

Minor cleaning and restoration of parts was required for the skeletal remains of both entries prior to analysis. Cranium No. 217, which largely contributes the morphological data of this study, lacks the middle and right zygomaxillary portions of the facial skeleton (Fig. 1). The skull and mandible, otherwise well-preserved, are those of a male, possibly 18 to 22 years of age. The basilar suture (spheno-occipital synchondrosis) is fused and the lower third molars are fully developed and erupted, both elements suggesting an age at least in the late teens. The cranial vault sutures are open ectocranially and, as far as can be seen through the foramen magnum, endocranially, suggesting an age less than 20 to 22 years (Montagu 1960:609). The sex is suggested by the overall contours of the skull, prominent glabella and supraorbital ridges, rounded superior orbital margins, thickly developed zygomatic processes of the frontal bone, prominent supramastoid crests, evident nuchal ridge, and the development of an inion process.

The sex of the person catalogued No. 102 is difficult to assess because of the fragmentary nature of the find. There is little doubt that the bones are those of an adult: at least one third molar is present and fully developed; the lower right third molar was erupted as indicated by the presence of a fully developed socket; all of the teeth present show more advanced occlusal attrition than those in No. 217. Comparable parts indicate that the person was smaller than No. 217; for example, the height of the mandibular body, measured in the plane of the right mental foramen, is 26.5 mm as opposed to 30 mm in the same location of No. 217. The jaw portion, No. 102, is less ruggedly built than that of No. 217, and the preserved portion of temporal bone does not show the sharp supramastoid crest evident in No. 217. These comparative elements may identify a female.

The possibility that the Plum Point skeletal remains might belong to the Initial Woodland period is based on artifact findings in the Perth Museum. Mr. Watson reported that a cut mica sheet (10.5 x 11.0 cm) was in a museum box underneath the bone fragments and teeth of No. 102, and that 14 pottery sherds were in the same box with the bones of No. 217. According to Mr. Watson, the mica sheet would be consistent with a Woodland burial reflecting Adena or Hopewell cultural influences. Following a brief examination of all the cultural items, Dr. J. V. Wright, Ontario archaeologist with the National Museum of Man in Ottawa, reported

that the presence of cut mica would suggest a period anywhere from 600 B.C. to A.D. 600, while decorative elements on the pottery sherds would suggest late Point Peninsula culture affinities, ca. A.D. 200 (J.V. Wright 1972:46, 1981: personal communication).

*DESCRIPTIVE MORPHOLOGY AND PATHOLOGY*

Measurements of the skull and mandible, No. 217, following the techniques of Olivier (1969), are shown in Table 1.

TABLE 1  
MEASUREMENTS AND INDICES OF SKULL NO. 217

Measurements in mm		Indices	
Glabello-occipital length	179	Cranial	78.2
Maximum bi-parietal breadth	140	Fronto-parietal	62.1
Minimum frontal breadth	87	Cranial module	150.3
Basion-bregma height	132	Length-height	73.7
Auricular height	112	Breadth-height	94.3
Bregma-porion height	111	Mean basion height	82.8
Biasterionic breadth	110	Mean porion height	69.6
Bizygomatic diameter	131	Transverse cranio-facial	93.6
Basion-nasion distance	102	Gnathic	102.0
Basion-prosthion line	104*	Upper facial	54.2
Upper facial height	71**	Facial	86.3
Facial height	113**	Nasal	46.4
Nasal height	56**	Ramus	52.5
Nasal breadth	26**		
Mandible length	107		
Bigonial breadth	105		
Bicondylar width	124		
Symphyseal height	30		
Ramus height	61		
Minimum ramus breadth	32		

\*Estimated measurement

\*\* Approximate measurement

The cranium, while exhibiting male characteristics, is not unduly rugged or robust. Both skull and mandible are small, the small size of the neurocranium alone reflected in a cranial module of 150.3. Although it is metrically mesocranic, the vault visually suggests roundness. The occipital pole is defined by a slightly developed superoinferiorly broad nuchal ridge, accented by a small inion process producing a low occipital apex. The frontal bone is full, accentuated by mediobilateral bossing, and has but a slight slope. When viewed from above, the shape of the vault might be described as pentagonoid to ovoid. It is medium high as described by four different indices.

The supratemporal lines are placed high on the parietal bones, and there is only a hint of sagittal keel. There is a discrete complex of large Wormian bones in the left lambdoidal suture, and a small accessory bone at lamda. The right parietal bone folds locally onto the lambdoidal suture, and the left parietal bone shows a similar fold onto the complex of Wormian bones (Fig. 1).

The supraorbital ridges are moderately developed, continuous with glabella, and form a low broad V which blends almost imperceptibly with the superior orbital margins.

What remains of the facial skeleton suggests a medium width to height relationship with moderate subnasal prognathism. Relative to the vault, the facial skeleton is narrow, as metrically demonstrated by the transverse cranio-facial index (Olivier 1969:150). There is

TABLE 2

## NON-METRIC OBSERVATIONS ON SKULL NO. 217

Variant	Presence, Absence or Form
Palatine suture direction	Anterior
Metopism or trace	Absent
Supraorbital grooves	Absent right and left
Supraorbital foramen	Single right; nearly closed single notch left
Infraorbital foramen	Single left
Posterior zygomatic fissure	Absent left
Premaxillary suture	Absent
Palatine torus	Absent right (anterior to palatine suture)
Pterygospinous spurs	Present bilaterally
Pterygobasal spur or foramen	Absent right and left
Foramen ovale & Foramen spinosum	Normally disposed bilaterally
Spinobasal spur or foramen	Absent right and left
Divided hypoglossal canal	Present right; absent left
condylar canal	Present bilaterally (right very small; left large)
Occipital condyle	Oval bilaterally
Precondylar facet or tubercle	Absent
Ossified apical ligament	Slightly developed
Paramastoid process	Absent right and left
clinoid process variations	carotico-clinoid foramen right; carotico-clinoid spur left
Sagittal sinus direction	Turns right
Parietal foramen	Absent right; single left
coronal Wormian bones	Absent right and left
Bregmatic ossicle	Absent
Sagittal Wormian bones	Absent
Lambdic ossicle	Present (small)
Lambdoidal Wormian bones	Discrete complex of 3 bones on left; none on right
Os Inca or trace	Absent
Epipteric bone	Absent right and left
Parietal notch bone	Absent right and left
Asterionic bone	Absent right and left
Occipitomastoid bone	Absent right and left
Tympanic dehiscence	Absent right and left
Auditory exostosis	Absent right and left
Mandibular torus	Absent right and left
Mylohyoid arch	Absent right and left
Multiple mandibular foramina	Absent right and left
Multiple mental foramina	Absent right and left
Lingual mandibular bone defect	Absent right and left

virtually no lateral malar projection as indicated by the left side; there is a moderately developed malar tubercle and a small zygomaxillary tubercle; both marginal tubercles are large. The nasal aperture is narrow, relative to nasal height, and has a distinct or "sharp" subnasal margin. The frontal bone is narrow, relative to maximum bi-parietal breadth.

The mandible has a mediobilateral chin, slight to moderate gonial eversion, shallow sigmoid notches, and condyles that are slightly higher than or equal to the level of the coronoid processes. The ascending ramus is nearly vertical and somewhat broad relative to its height.

Table 2 presents additional non-metric morphological observations on the skull and mandible. In conjunction with the data for the mandible, the mandibular fragment, No. 102, has a single mental foramen. This is the only skeletal feature of morphology that could adequately be studied among the fragments assigned to that catalogue number.

Nine upper and ten lower teeth are present in the jaws of No. 217. In the upper jaw, the right first molar was lost before death and the socket is resorbed. There is no space for the left second premolar which is congenitally missing. The canine is slightly rotated distally and the first premolar is slightly rotated mesially. The twentieth tooth associated with this entry is peg-shaped and may be an upper third molar; it could not be tested in either maxilla since the alveolar bone in both terminates at the second molar sockets as a result of post-mortem damage.

The lower right first molar exhibits a Y5 cusp pattern, and the upper left first and second molars feature the Y4 cusp pattern. The left lateral incisor, while worn, suggests a shovel-shape crown. Both lateral incisors have central lingual pits within a slightly developed cingulum. Both lower third molars have three distinct roots, and the first molars each have two roots.

Unlike No. 217, there are no apparent anomalous dental conditions in the upper jaw of No. 102 which includes whole or partial sockets and (or) teeth for the right second molar through left first molar. In the fragmentary lower jaw, the second and third molars were very closely spaced at the roots judging from the position of the sockets. Both upper first molars suggest a Y4 cusp pattern. There is clear evidence of the shovel-shape in both lateral incisors, and both of these teeth have distinct lingual tubercles. Both lower second molars have two fused roots, and sockets for the right first molar indicate the tooth had two roots.

#### *Dental and Other Pathology*

For No. 217, the labial incisive edges of both upper lateral incisors and the right canine show irregular antemortem fractures. None of the upper teeth are carious. Overall, there is slight to moderate occlusal attrition with primary dentin exposed on both lateral incisors, both canines, the lone first molar, and barely on the second molars and left first premolar.

In the lower jaw all of the teeth, including the third molar, show slight to moderate occlusal wear, with primary dentin exposed on the one (right) lateral incisor present, both canines, and the left first molar. The left third molar has a large occlusal caries that involves two-thirds of the crown. The crown of the second molar has been destroyed by caries, leaving only the separate mesial and distal roots intact. Both second molar sockets have been eroded and expanded by periapical abscesses.

Both lower and upper teeth show accumulations of calculus on the crown near the roots. In occlusion, the upper and lower jaws produce a noticeable overbite.

The teeth of No. 102 show moderate to advanced occlusal attrition; the teeth are worn flat, and there is greater exposure of dentin in those teeth directly comparable with No. 217. None of the 14 teeth show evidence for caries, and there are no instances of periapical abscesses.

In the cranium, No. 217, there is porousness and pitting in the roofs of both orbits, a condition that appears similar to *cirbra orbitalia*, suggested by various researchers to indicate anemia (El-Najjar et al 1976; Cybuiski 1977).

*BIO-TEMPORAL IDENTIFICATION*

Anderson's (1968) study of the Serpent Mounds site physical anthropology included comparisons in morphology and dental pathology between two temporally disjunct skeletal population samples. One was represented by burials in the mounds and assigned to the first through third centuries A.D. (Johnston 1968:75-76); the other was represented by burials in ossuary pits some distance north of the mounds and assigned to Late Woodland times, ca. A.D. 1000-1300 (Johnston 1979:93). Univariate differences in skeletal morphology between the two samples were interpreted as temporally diagnostic biological markers in a common regional population that had undergone microevolutionary change from Initial (Middle) Woodland to Terminal (Late) Woodland times to later prehistoric Iroquois. The last connection was based on comparisons between the "Mound" and "Pit" components, and a 14th Century skeletal series from the Fairty ossuary (AlGf-3) near Markham (Anderson 1964).

Anderson tested his results for bio-temporal identification by comparing the skeletal morphology of remains from other sites against a scoring chart that emphasized differences between the Mound and Pit groups in seven craniometric means, and five postcranial and nine craniomandibular non-metric variants (Anderson 1968:52). Included in the test were skeletal remains from Initial Woodland period and other sites. The Initial Woodland sites were: (1) Brock Street (BbGn-3) in the city of Peterborough which produced a single burial with Point Peninsula grave goods assigned an age of ca. 2,000 years B.P. (Kenyon and Cameron 1961); (2) the Point Peninsula 2 Kant site (BjGg-1/ BjGh-1) in Renfrew County (Emerson 1955) which produced an intact adult male skull that, judging from discussion elsewhere (Wright and Anderson 1963), may be comparable in age with the Mound group at Serpent Mounds; (3) Donaldson (BdHi-1) near Southampton, Lake Huron, with a Saugeen Focus cemetery assigned an age of 500 B.C. (Wright and Anderson 1963). Skeletal remains from Cameron's Point (BbGm-1) in Peterborough county (Spence and Harper 1968), similar in age to either or both the Mound and Pit components of Serpent Mounds, were also tested.

Results of the tests indicated that the single male skeleton from the early Donaldson cemetery, the adult male skull from Kant, and the adult male skeleton from Brock Street favorably compared with the Mound group, thus demonstrating their early biological affinities. Of two individuals from Cameron's Point, Burial N and C.P. No. 1, the latter compared most favorably with the Mound group while the former most closely fitted the pattern of the Pit group.

The Plum Point skull, No. 217, was tested against Anderson's scoring chart. Of 15 testable traits, including six metric and nine non-metric, the cranium and mandible side with the Mound group in nine features and with the Pit group in six. Metrically, Plum Point shares three features with the Mound group and three features with the Pit group. Of interest is that all features shared with the Pit group relate to size, while all features shared with the Mound group relate to shape. The Plum Point skull is smaller than the Pit group means and much smaller than the Mound group means in cranial module and minimum frontal breadth, and equal to the Pit mean and smaller than the Mound mean in ramus height. It is comparable with the Mound group in length-height index, upper facial index, and nasal index.

In craniometry, shape is generally considered to be more taxonomically relevant than size (Corruccini 1973). Similarly, non-metric morphology often reflects taxonomic elements more closely than does metric morphology (Ossenberrg 1977). Of the nine testable non-metric variants, Plum Point fits the Mound pattern in six and the Pit pattern in three. The taxonomic consensus, therefore, places the Plum Point cranium with the earlier Mound group; it may, on this basis be said to emulate an Initial Woodland morphological (i.e., biological) pattern (Fig. 2).

### PLUM POINT CRANIAL MORPHOLOGY COMPARED WITH MOUND AND PIT COMPONENTS OF SERPENT MOUNDS

CHARACTER	MOUND	PLUM POINT	PIT
<b>SIZE METRICS:</b>			
Cranial module	156	150.3	154
Minimum frontal breadth	95.7	87	94.7
Ramus height	64	61	61
<b>SHAPE METRICS:</b>			
Length-height index	74.7	73.7	71.4
Upper facial index	52.1	54.2	50.0
Nasal index	45.5	46.4	53.0
<b>NON-METRICS:</b>			
Divided hypoglossal canal	+	+	-
Pterygospinous spurs	+	+	-
Zygomaxillary tubercle	+	+	-
Blurred nasal margin	-	-	+
Multiple mandibular foramen	-	-	+
Tympanic dehiscence	-	-	+
No posterior condylar canal	+	-	-
Anterior palatine suture	-	+	+
Mylohyoid arch	+	-	-

Fig. 2. Plum Point cranial morphology compared with Mound and Pit components of Serpent Mounds.



A potential problem with this association, however, is the presence of carious teeth in the Plum Point mandible. To some extent, dental pathology and occlusal attrition also served to differentiate Mound crania from Pit crania, and this was related by Anderson to subsistence differences between earlier and later populations of Ontario. The earlier Mound jaws featured a high degree of occlusal attrition and a very low incidence of caries, a reflection of a hunting and gathering economy. Pit jaws featured less attrition and a higher incidence of caries, a reflection of an agricultural economy (Anderson 1968).

Subsequent studies of Ontario skeletal samples have strongly suggested a pattern of seriation through time based on the relative incidence of dental caries. The pattern was initially suggested by a study of skeletal remains from the Surma site (AfGr-2) in Fort Erie (Cybulski 1968) and further demonstrated by a study of skeletal remains from a second cemetery at the Donaldson site (Molto 1979). These two samples are among the most recent of Initial Woodland period skeletal remains. The Surma site has been assigned to the Princess Point complex in southwestern Ontario, dating A.D. 500-900 (Stothers 1977). The second cemetery at the Donaldson site, excavated in 1971 (Finlayson 1977) and referred to as Donaldson II (Motto 1979), is thought to date 1,000 years later than the cemetery (Donaldson I) reported by Wright and Anderson (1963) U.V. Wright 1981: personal communication).

When compared with Anderson's (1968) scoring chart for morphological differences, the skeletal remains from the Surma site were found to represent "an intermediate physical variety that could probably have occurred during the transition from Middle to Late Woodland times" (Cybulski 1968:22). This apparently transitional population exhibited higher incidence of caries than the Mound group but lower than the Pit group and substantially lower than the fully agricultural late 13th Century Bennett site (AiGx-1) population reported by Wright and Anderson (1969). These comparative data (Cybulski 1968:24) suggested that the Surma site population represented an incipient agricultural community, a significant finding as it probably was through the Princess Point complex (i.e., late Point Peninsula times) that corn agriculture was introduced to Ontario (Wright 1972:57).

In his study of the crania from the Donaldson II cemetery, Molto (1979) noted similarities in dental pathology and cranial morphology to the Surma materials, as might temporally be expected.

When all 34 teeth in the Plum Point collection, including those with entry No. 102, are considered, the two carious teeth in No. 217 provide an incidence of 5.9 percent. This figure is lower than the incidences of 7.4 and 7.7 percent reported for Surma and Donaldson II respectively, and lower yet than the caries incidence of 10 percent reported for the Pit group at Serpent Mounds (Fig. 3).

#### CONCLUSIONS

Features that tend to distinguish Initial (Middle) Woodland and Terminal (Late) Woodland Ontario crania, particularly in taxonomically relevant elements of shape and non-metric morphology, suggest that the Plum Point cranium has greater affinities with the earlier groups. In terms of dental pathology, namely in the incidence of dental caries, the Plum Point materials fit a pattern of seriation between the temporally "early" Point Peninsula Mound component of Serpent Mounds and the temporally "later" Initial Woodland Surma and Donaldson II skeletal samples. The osteological data, therefore, tend to place the Plum Point materials somewhere in the latter half of the Initial Woodland period as temporally defined by Wright (1972:41). While the findings are consistent with the late Point Peninsula assignment of the pottery sherds found, but not originally documented with the bones in the Perth Museum, it should be recognized that the assessment is a best probability estimate for a single skull and

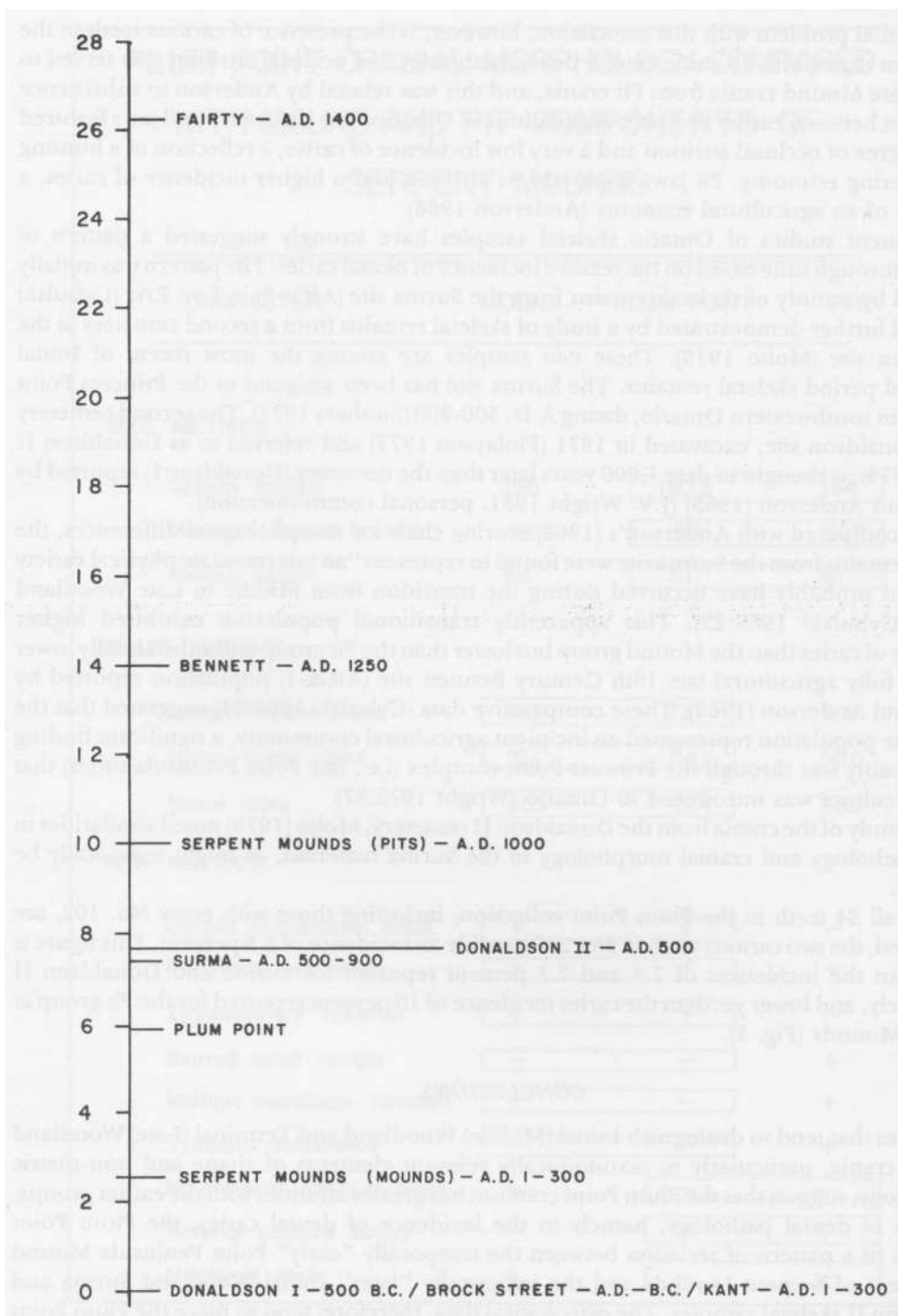


Fig. 3. Percent incidence of dental caries on Ontario skeletal samples. The Fairty value is an average for five tooth-group samples (6% for incisors to 62% for lower molars) as reported by Anderson (1964: 43).

34 teeth. Ideally, studies for possible bio-temporal associations should employ large single site samples in order to examine possible influences of individual and regional variation in skeletal morphology and dental pathology. The present Plum Point skeletal assignment must be considered as tentative, and it is hoped that additional remains will be available in future for further studies of bio-temporal identification in the Plum Point area.

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