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# Analysis of the Skeletal Remains from the Surma Site, Fort Erie, Ontario

## ABSTRACT

A population of approximately 22 individuals from a late Middle Woodland to Late Woodland burial site in Ontario is examined in this report. Aspects of morphological variation, pathology, and dental pattern are included in the study. Comparisons with other prehistoric peoples from the province suggest that this group had belonged to an incipient agricultural community. The population is transitional in morphology between Middle and Late Woodland skeletal groups. In continuous morphological characters, the crania generally resemble that of the Iroquois physical variety.

## INTRODUCTION

The Surma Site (Ar Gf-1), Fort Erie, Ontario, was excavated in May, 1965 by Dr. J. N. Emerson, Mr. William C. Noble, and a group of University of Toronto students. A preliminary archaeological report has been published (Emerson and Noble: 1966). The present paper concerns the osteological analysis of the burials.

The burial complex was associated with grave goods attributable to Middle to Late Woodland times, and to the later Hunter's Home Phase which began around 700 A.D. (Emerson and Noble, 1966:81). Previous osteological studies of various sites in Ontario (Anderson: 1962; Wright and Anderson: 1963; Anderson: 1964; Anderson: n.d. 1; Anderson: n.d. 2) have demonstrated the morphological affinities and differences between Middle and Late Woodland populations. The tentative dating of the Surma Site suggests the possibility of a morphologically intermediate population within the transition from Middle to Late Woodland times.

The excavation yielded eleven skeletons in varying states of preservation, a twelfth burial represented only by teeth, and the additional fragments of at least two adults and one infant. Seven more individuals are represented by skeletal material from the site that was sent to Toronto in December, 1964. These bones were recovered from pits, some 18 to 27 inches deep, in the same general area that enclosed the excavated burials.

The 1965 burials are herein numbered 1 through 11 and correspond to the sequence that appears in the archaeology report, while the twelfth individual, not reported previously, is designated as Burial 12. The reference number system marked on the 1964 material is retained.

### THE INDIVIDUALS

The individuals which make up the Surma population are listed according to age and sex in Table 1. The following is a brief description of these skeletons.

*Burial 1.* The very fragmented skull is that of an adult male, probably around middle age. Portions of both humeri and lower limb bones are present but their friable condition did not allow analysis.

*Burial 2.* This burial contained the remains of another male in the same age range as that of Burial 1. Arthritic pitting has occurred on the right mandibular condyle but no corresponding condition is evident on the articular eminence or in the mandibular fossa of the temporal bone. Of twenty-four potential sites in the dentition, four exhibit premortem tooth loss. Carious lesions are present on two mandibular molars, and an alveolar abscess has formed below one of these.

*Burial 3.* The pelvic characteristics of this skeleton and a femoral head diameter of .18 mm. are indicative of the male sex. The morphology of the pubic symphysis provided an age estimate of 27 to 30 years according to the Todd method of analysis (Todd: 1920), and 29.18 years when compared with the models of McKern and Stewart (1957).

*Burial 4.* The unfused sphenoccipital synchondrosis and appearance of the pubic symphysis indicate an age under 17 years for this individual. The distal ends of humeri, excluding the medial epicondyles, are the only epiphyses that are joined to the long bone shafts. Union of the three innominate centers of ossification has not yet occurred, nor have the vertebral body epiphyses fused. All permanent teeth have erupted except for the third molars. These criteria taken together suggest an age of 15 to 16 years.

In the dentition, wear facets occurring on the mesial sides of the crowns of both upper central incisors indicate crowding and mesial rotation. Attrition with exposed dentin increases on these teeth in a distal to mesial direction on the occlusal surfaces.

*Burial 5.* This is the complete but very friable skeleton of an infant with primary dentition whose unerupted second molars and incompletely developed canine roots suggest an age of 16 — 18 months. The vertebral arches are unfused to their bodies.

*Burial 6.* No skull was available for analysis from this dismembered burial. The lower limb bone fragments are those of an adult.

*Burial 7.* As in Burial 6, there was no skull with this individual. The

TABLE 1. Summary of the Surma Site Skeletons

Burial No.	Age	Sex
1	Adult	Male
2	Adult	Male
3	27-30 yrs.	Male
4	15-16 yrs.	Male
5	16-18 yrs.	?
6	Adult	?
7	Adult	Male?
8	Adult	?
9	Adult	Male
10	Adult	?
11	18-21 yrs.	Female
12	- 6 yrs.	?
64,1a	Young Adult	Female
64,1b	Adult	?
64,1?	Adult	Female?
64,2a	Adult	Female
64,2b	Adult	Male?
64,4	Adult	Male
64, ? (1)	15-18 yrs.	Male?
64,? (2)	14-18 yrs.	?

lower limb bones and two lumbar vertebrae are those of an adult. A femoral head diameter of 46 mm. associated with a relatively tall stature (68.9") when compared to the other individuals in the population may be indicative of the male sex. There is marked antero-posterior bowing of the right femoral shaft, and the fibula is bowed medio-laterally.

Below the left tibial tuberosity, there is a raised area at the common patellar tendon attachment. Subperiosteal hematomas, approximately 1.0 cm. in diameter, occur on the lateral halves of the anterior surfaces of both patellae. These are crossed with tendinous ridges. The deformity below the tibial tuberosity could be an associated result of this injury.

*Burial 8.* This adult individual is represented by very fragmentary infracranial bones. These are quite robust although no other sex indicators are included. Osteoarthritic lipping is in evidence on all articular surfaces. One distal fragment of a phalanx is compressed with a facet on its lateral side. There is a large foramen through the scapular body in the infraspinous fossa, 3 cm. medial to the glenoid fossa. Although the surrounding bone is smooth posteriorly, the anterior aspect of this foramen shows an eroded condition not unlike that of an abscess.

*Burial 9.* The skeleton is that of a male of early middle age. He is characterized by a very rugged skull (Fig. 1) with large mastoid processes, heavy markings, and a slight sagittal elevation. The temporal lines are very prominent and the parietal bones fold over the lamboid suture just above asterion. An occipital mound with a low apex is present and the frontal slope is rounded with no grooves. No unusual bossing occurs and the form of the vault is rhomboid when viewed from above. The skull is mesocranic with a cranial index of 76.6, low in relation to its length, and has a cranial module of 157,3 which is indicative of its large overall size. An orbital index of 97,4 confirms the appearance of high squared orbits under the V-shaped brow ridges. Although the coronal suture is partially obliterated, there is evidence of a wormian bone within it. A large lamboid wormian bone on the left side partially infringes on lambda (Fig. 1).

The dentition is marked by a number of anomalies. In the mandible, the right first molar has a small third lingual root. The socket of the left first molar is eroded premortem with a buccal alveolar abscess and has a space for a similar third root. This tooth was probably lost just prior to death. The second premolar is single rooted and peg-like with a flared crown. The first premolar of the right side is double rooted.

The most noticeable anomaly of the maxillary teeth is an unidentifiable congenitally deformed tooth (Fig. 4C). On first observation, the crown of this tooth is similar to the projecting conical crown of a canine. It is, however, grooved vertically on three of its sides and the corresponding enamel constrictions are true infoldings as shown by the form of the dentin in cross section. A small groove is present on the fourth side near the occlusal surface so that the crown appears X-shaped from above. The root is complete but has sharp edged vertical grooves. The only teeth missing are the left second premolar and right central incisor and the deformed tooth may be either one of these. The bevelled occlusal surface

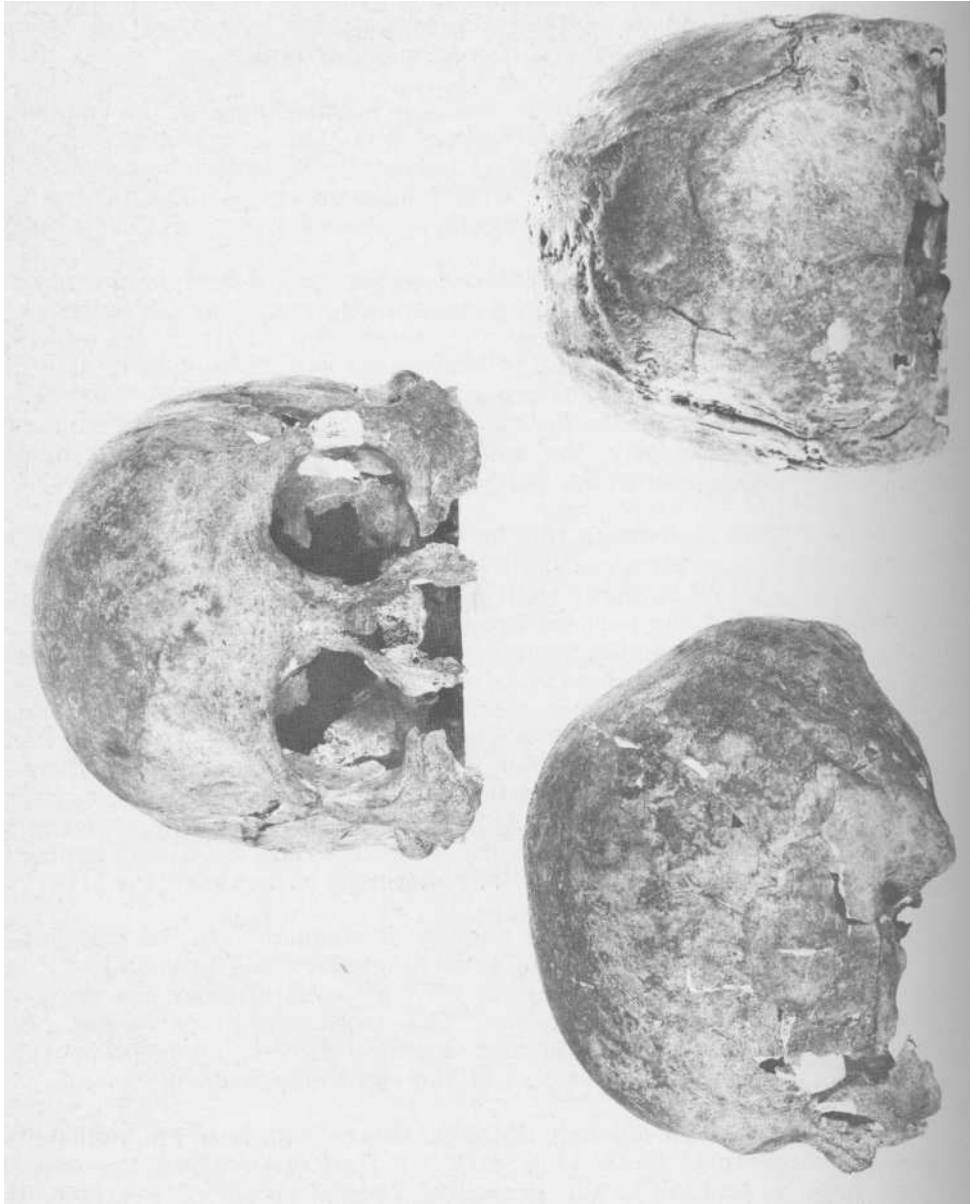


Figure 1. Three views of the Burial 9 male skull. A large wormian bone in the lambdoid suture to the left of midline can be seen in the rear view.

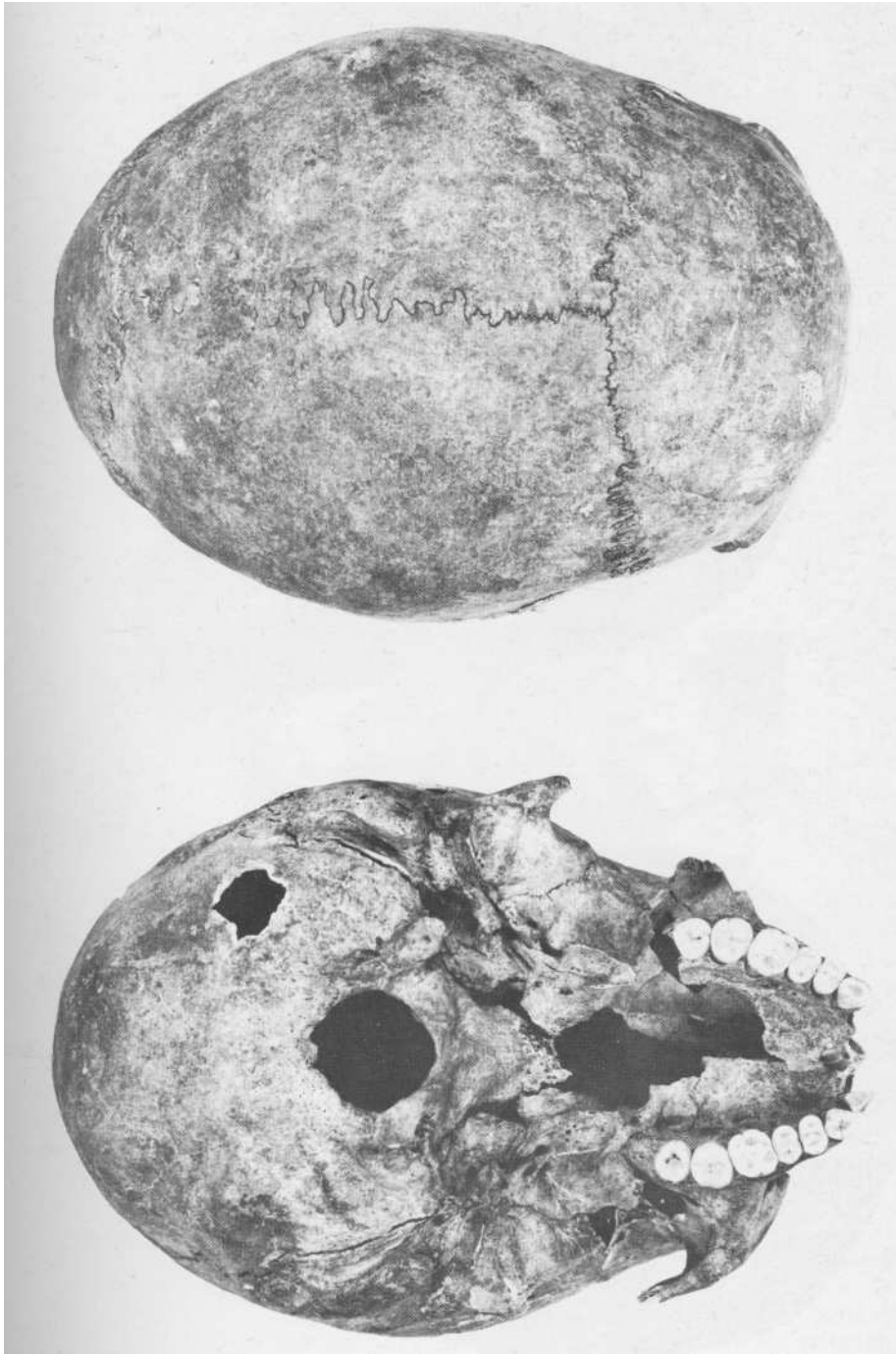


Figure The skull, Ft. E/64, la as seen from above and below. Note the faceted paramastoid process in the basal view.

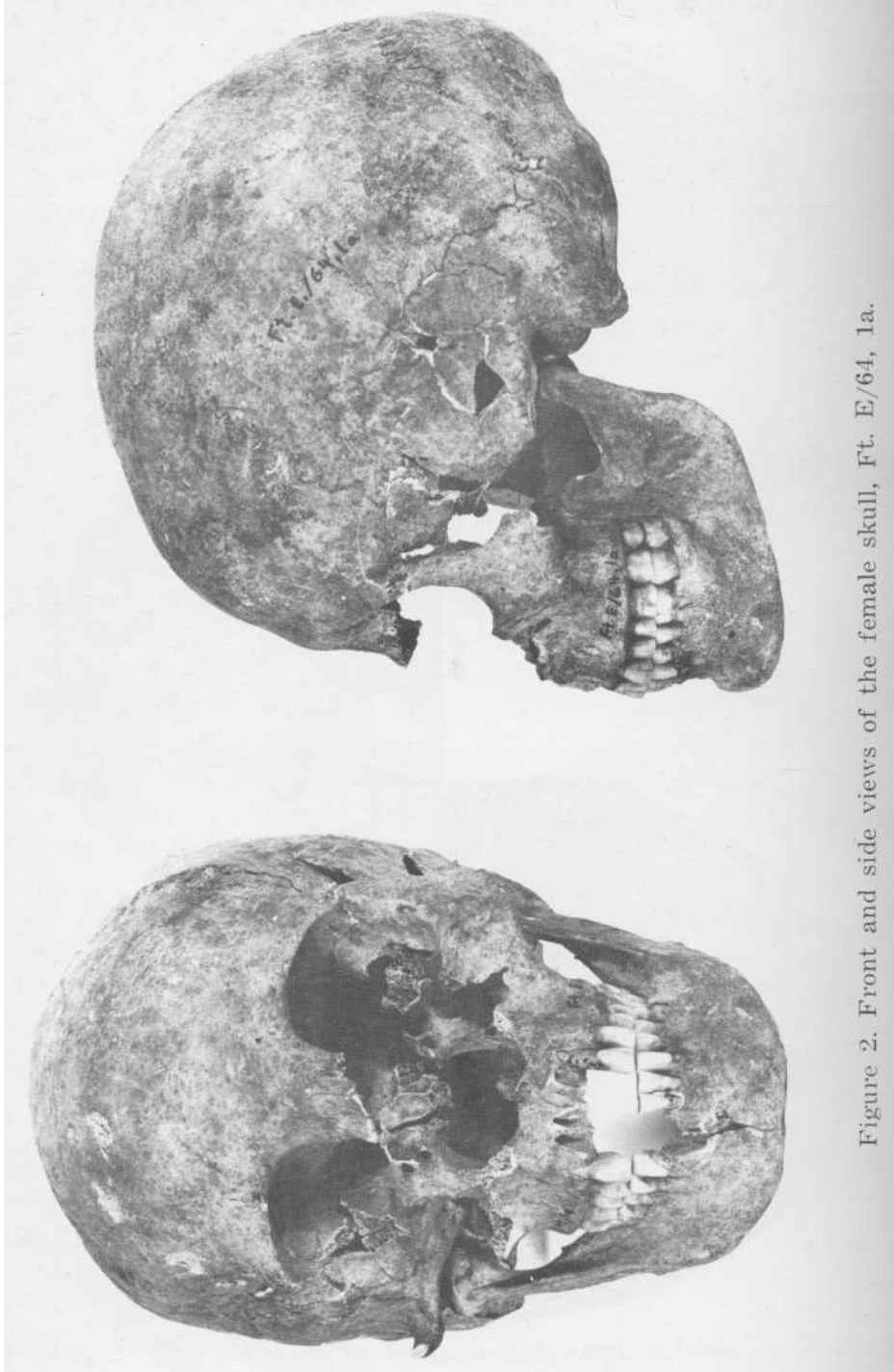


Figure 2. Front and side views of the female skull, Ft. E/64, 1a.

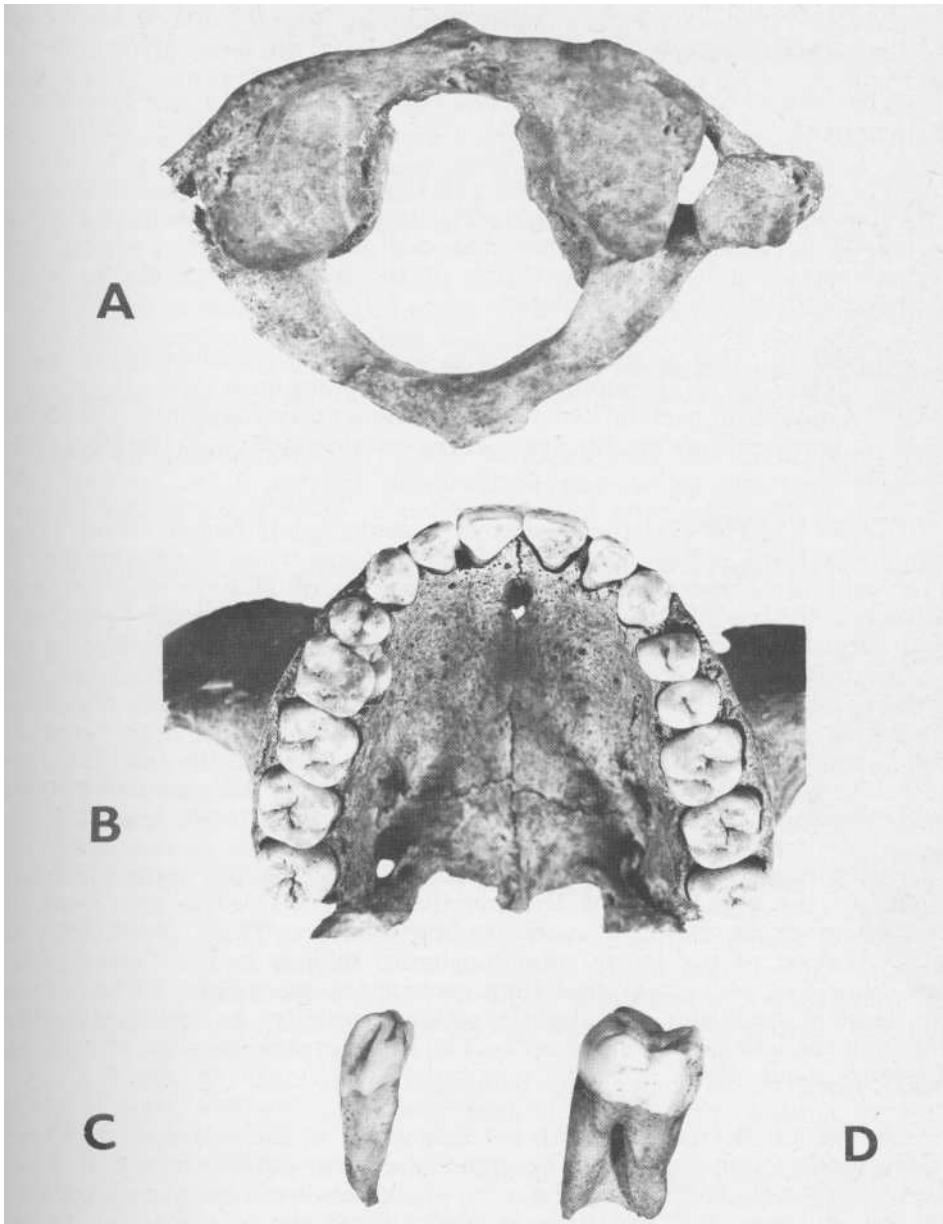


Figure 4. A) The atlas of Ft. E/64, 1a has a corresponding accessory facet for the paramastoid process on the skull.  
 B) The maxillary dentition of the individual from Burial 11 has a retained primary molar in the right half. Its permanent successor is partly erupted and impacted below.  
 C) The deformed tooth from Burial 9.  
 D) A second molar of individual Ft. E/64, ?1. The roots are joined by a sheet of cementum.



of this tooth indicates that it was not positioned vertically in the tooth row and thus could be a supernumerary tooth with the root wear caused by the abrasive action of adjacent teeth.

The upper first premolars have two thin buccal roots and a full lingual root.

The right fifth toe of this individual has an anomalous condition in that the middle phalanx is considerably reduced in length and its shaft is increased in diameter. The proximal end is flared and distorted and corresponds to a built up distortion of the distal end of the proximal phalanx with which it articulates.

*Burial 10.* This is the burial of a dismembered adult who is represented mainly by infracranial remains. Of the cranium there is only one small fragment of parietal bone and a fragmentary mandible. The bones show male ruggedness but the angle of the sciatic notch could be interpreted as female.

*Burial 11.* The skeleton is that of a young adult female whose pubic symphysis form indicates an age of 20-21 years when Todd's method is used, and 19.04 years according to the models of McKern and Stewart. Although the mandibular third molars have erupted, their roots have not completely formed. The medial epiphysis of the right clavicle is not joined to the shaft, and the humeral heads are not completely fused. The distal epiphyses of the right radius and ulna are joined to their respective diaphyses but have not yet fused. Traces of epiphyseal lines occur on both femoral heads and the iliac crests are not fused to the ilia. The first sacral vertebral body is not fused to the second. All age determining criteria demonstrate an age at death of between 18 to 21 years.

All permanent teeth are present as well as a retained second primary molar in the right half of the maxilla (Fig. 4B). The crown of its permanent replacement is visible in the alveolus. There is evidence of late retention of the lower second primary molars in the form of tiny resorbing root sockets around their permanent successors, which are at the level of occlusion and slightly rotated mesially. A similar condition exists in the left half of the maxilla. The lower central incisors are rotated mesially about 45°.

*Burial 12.* A twelfth burial, not mentioned in the archaeology report, is represented only by teeth. The upper and lower dentitions are probably those of a single individual. The state of dental development approximate an age of between 2 and 6 years, probably closer to the latter figure.

In addition to the burials just described, there are at least two adults and one child represented by unassociated skull fragments which have been included in the population study to be dealt with later. On examination in the laboratory it was found that the mandible, Ft. E/64,1b, belonged with the skull of Ft. E/64, 1a and the mandible of this skull, numbered the same, represented a different individual. The 1964 skeletons are described as follows :

*Ft. E/64, 1a.* This is the cranium, mandible and dentition of a young adult female. The atlas, axis, and right humerus are also present. All sutures of the skull are open, but the sphenoccipital synchondrosis is fused and the third molars are completely erupted.

The skull is shown in Figure 2 and 3. A cranial index of 75.0 places this skull at the extreme lower range of mesocrany and is indicative of its tendency to the long headed condition. The skull is low in relation to its length and breadth and a low cranial module reflects its small female size when compared with burials 9 and 11. Its face is not prognathic and has a short and wide palate as exemplified by the gnathic (94.2) and maxillo-alveolar (124.5) indices. The frontal slope is rounded, there is marked parietal bossing, and the occiput takes the form of a mound with a low apex. The vault when viewed from above is rhomboid in form. The subnasal margin is blurred, and the slight brow ridges are V-shaped.

An outstanding feature in the basal view of this skull (Fig. 3) is the presence of a faceted paramastoid process on the right side. A corresponding extra facet is present on the atlas (Fig. 4A).

A pathological abscess has revealed the sinus of the right mastoid process.

*Ft. E/64, 1b.* This individual is represented only by the right zygoma and maxilla, and a mandible (1a). The dentition is that of an adult but sex cannot be determined.

*Ft. E/64, 1?* These are infracranial fragments whose provenience had been lost prior to their arrival in the laboratory. The distal halves of right and left femora and proximal portions of right and left tibiae are those of an adult. Their gracile form is suggestive of the female sex and these bones could possibly belong to *Ft. E/64, 1a*.

*Ft. E/64, 2a.* This is the calvarium of an adult female. There is a constriction around the vault immediately behind and in line with the coronal suture. The coronal and lambdoid sutures are opened while the sagittal suture is completely obliterated suggesting premature fusion.

*Ft. E/64, 2b.* This adult individual is represented by a calvarium, possibly male, and a fragmentary portion of the right scapula.

*Ft. E/64, 4a.* This male adult calvarium has a cranial index of 80.2 which places it in the lower range of brachycrany (round headed).

*Ft. E/64, ?.* Two individuals are represented by this reference number. Individual 1 is subadult with an unfused sphenoccipital synchondrosis, second permanent molars erupted to the occlusal plane but with roots not completely formed, and an unfused left coracoid process. The meager criteria indicate an age of at least 15 but not yet 18 years. Incipient secondary sex characteristics of the skull are suggestive of male status. The lingual and mesial roots of the upper second molars are joined mesially by a sheet of cementum (Fig. 4D). Although both of these teeth and

the lower first molars have four cusps predominating, there is a small fifth cusp, bisected by a fissure in the disto-buccal position of the occlusal surface of each tooth.

Individual 2 includes a mandible plus two upper second molars. A slightly younger age is indicated by the incompletely formed roots of these teeth and those of the mandible.

### POPULATION MORPHOLOGY

The burials recovered in 1964 and in 1965 resemble each other morphologically. The illustrated skulls serve to demonstrate the most commonly occurring continuous traits.

The Surma crania are generally characterized by a mound shaped occiput, rhomboid vault form, parietal bossing, V-shaped brow ridges, and blurred subnasal margins. These features, except for the last, are suggestive of the Iroquois type of skull (Anderson: 1962). The non-conforming trait is characteristic of a much earlier physical variety which includes the Donaldson crania (Wright and Anderson: 1963).

The median chin form, a further characteristic of Iroquois morphology, occurs in only three of ten mandibles. Two of the total demonstrate the bilateral chin feature of the Donaldson type, while a medio-bilateral form, combining both traits, occurs in the remaining majority.

Wormian bones occur frequently in the lambdoid suture (6 of 9 cases). A coronal Wormian bone is present in only 1 of 8 crania, and sagittal sutural bones do not occur at all (0 of 9). One of nine skulls has a lambdic bone, while none of them show any evidence of a bregmatic bone. Asterionic bones are present in 3 of 13 sides, and epipteric in 0 of 8.

Supraorbital foramina and notches are equally distributed when sides are treated separately. The lack of multiple mental foramina in the mandibles (0 of 17 sides) agrees with the low incidence of this anomaly in previously studied populations in Ontario. Further indication of a shared morphological heritage with these groups is reflected in the low frequency of occurrence of the superior sagittal venous sinus turning to the left (2 of 10 occipital bones).

Because of the dearth of measurable specimens from the site, metrical distinction of individuals is of little importance. Tables 2 and 3 list the measurements that could be obtained. The measurement techniques used are those described by Montagu (1960), and stature estimation is based on the methods of Trotter and Gleser (1958). The cranial indices range from dolichocrany to brachycrany but tend to cluster toward the former condition. Cranial modules of the two female skulls are low when compared to that of the male as would be expected. Platymeria and platycnemia are distinct features of this group as in all earlier populations in the area. Statures range from approximately 5' 4" and 5' 5" for the females to 5' 9" - 5' 10" for the males.

TABLE 2. Craniometry (in millimeters).

Burial No.	2	3	9	11	64,1a	64,2a	64,2b	64,4
Cranial Length	187	—	192	184	188	—	—	172
Cranial Breadth	138	—	147	137	141	143	142	138
Basion-Bregma Ht.	—	—	133	134	127	—	—	—
Cranial Module	—	—	157.3	151.7	152.0	—	—	—
Cranial Index	74.0	—	76.6	74.5	75.0	—	—	80.2
Height/Length Ind.	—	—	69.3	72.8	67.6	—	—	—
Height/Breadth Ind.	—	—	90.5	97.8	90.1	—	—	—
Basion-Nasion	—	—	103	112	104	—	—	—
Basion-Prosthion	—	—	—	—	98	—	—	—
Gnathic Index	—	—	—	—	94.2	—	—	—
Min. Fron. Breadth	91	—	96	87	96	—	—	88
Bizygomatic Diam.	—	—	148	—	—	—	—	—
Upper Facial Ht.	—	—	—	—	66	—	—	—
Upper Facial Index	—	—	—	—	—	—	—	—
Total Facial Ht.	—	—	—	—	110 *	—	—	—
Total Facial Index	—	—	—	—	—	—	—	—
Orbital Height	—	—	37	31	35*	—	—	—
Orbital Breadth	—	—	38	39	41	—	—	—
Orbital Index	—	—	97.4	79.5	85.4*	—	—	—
Nasal Height	—	—	—	—	—	—	—	—
Nasal Breadth	—	—	—	24	—	—	—	—
Nasal Index	—	—	—	—	—	—	—	—
Alveolar Breadth	—	—	—	53	53 *	—	—	—
Alveolar Length	—	—	—	66	66 *	—	—	—
Alveolar Index	—	—	—	124.5	124.5*	—	—	—
Bigonial Diam.	—	116	112	100	90	—	—	—
Symphysis Height	—	—	—	—	30	—	—	—
Ramus Height	—	66	63	—	56	—	—	—
Ramus Breadth	33	36	36	35	34	—	—	—
Mandibular Length	—	114	116	106	111	—	—	—
Bicondylar Diam.	—	—	130	—	117	—	—	—

TABLE 3. Infracranial measurements (in millimeters).

Burial No.	2	3	6	7	9	10	11	64,1a	64,1?
Clavicle Length	—	167*	—	—	—	—	—	—	—
Humerus Length	—	347	—	—	332r	—	—	295r*	—
Max. Head Diam.	—	49	—	—	47r	—	40r	39r	—
Min. Head Diam.	—	45	—	—	44r	—	38r	37r	—
Ulna Length	—	287r	—	—	—	—	258r	—	—
Radius Length	—	266	—	—	—	—	237r	—	—
Head Diam.	—	23	—	—	22	—	19r	—	—
Femur Length	—	489	—	476r	461	—	—	—	—
Head Diam.	—	48	—	46r	46	—	40	—	—
Sag. Diam.	27*	29	25r	25	25	25	24	—	—
Trans. Diam.	35*	35	30r	33	37	33	34	—	—
Platymeric Index	77.1r*	82.9	83.3r	75.8	67.6	75.8	70.6	—	—
Tibia length	—	412r	—	—	392	—	—	—	—
Sag. Diam.	—	42r	34r	37	38	—	—	—	31
Trans. Diam.	—	21r	23r	22	22	—	—	—	22
Platycnemic Index	—	50.0r	67.7r	59.5	57.9	—	—	—	71.0
Fibula Length	—	—	—	—	—	—	—	—	—
Stature:	—	—	—	—	—	—	—	—	—
Centimeters	—	177.7 ±3.80	—	174.9 ±3.80	174.4 ±3.24	—	165.9 ±4.60	162.3 ±4.25	—
Inches	—	69.9	—	68.9	68.7	—	65.3	63.9	—

Anderson (n.d. 1) has devised a scheme for differentiating between Middle and Late Woodland skeletons from Ontario on the basis of his study of two populations from the Serpent Mounds site on Rice Lake. Of a large number of morphological criteria, some of which have already been described here, twenty-one proved to show significant differences between the early and late groups. Eight discrete traits occurred most frequently in the earlier Mounds population, while six showed a higher incidence in the later Pits group. An additional seven criteria of differences were based on metrical data. These data were further used to test individual skeletons of archaeologically determined age from other regions of Ontario. The method proved useful in assigning their correct physical type and has thus been established as a tool to associate chronological affinities of biologically similar peoples in the area.

An initial tabulation of morphological data on the Surma site skeletons shows that these people share biological features with the Serpent Mounds groups. The twenty-one significantly different traits, their frequency of occurrence at the Surma site, and consequent assignment to either Middle Woodland Mounds (M) or Late Woodland Pits (P) status are as follows:

Trait		Incidence Sample	Per cent	Status
Cranial module	155	1/3	33.3	P
Length/height	73	0/3	0.0	P
Minimum frontal	95	2/5	40.0	P
Up. facial ind.	51	0/0	—	—
Nasal ind.	49	0/0	—	—
Orbital Ind.	78	3/3	100.0	M
Ramus height	62	2/3	66.6	M
Bridges on the atlas		0/10	0.0	P
Septal aperture		4/7	57.1	P
Acetabular crease		5/6	83.3	P
Third trochanter		6/11	54.5	M
Vastus notch		2/10	20.0	P
Divided hypoglossal canal		4/8	50.0	M
No posterior condylar canal		3/9	33.3	M
Pterygoid spurs		3/3	100.0	M
Anterior palatine suture		1/1	100.0	P
Zygomaxillary tubercle		2/6	33.3	M
Blurred subnasal margin		4/4	100.0	P
Mylohyoid arch		4/13	30.8	P
Multiple mandibular foramen		2/12	16.7	M
Tympanic plate dehiscence		7/20	35.0	P

It can be seen from the above tabulation that the sample sizes are very small and caution must be used when assigning any one trait to Mounds or Pits status. Of the nineteen traits applicable, the Surma series resembles the Pits component of Serpent Mounds in eleven and the

Mounds group in eight. It cannot therefore be placed in one or the other category with any assurance. There is, however, a slightly greater representation of features characteristics of the later time period. A further check on these phenomena was made by testing each skeleton separately. This method produced the following results :

Individual	No. of Traits	Status Results
1	1	M
2	4	3P/ 1M
3	11	4P/ 7M
4	4	3P/ 1M
6	2	1P/ 1M
7	2	1P/ 1M
9	15	4P/11M
10	2	1P/ 1M
11	18	13P/ 5M
64,1a	15	9P/ 6M
64,1b	5	3P/ 2M
64,?(1)	6	3P/ 3M
64,2a	2	2P/
64,2b	1	P
64,4	1	P

Only 8 of the individuals in the above list can be tested with any accuracy and 4 of these leave a lot to be desired in terms of trait presence or absence. Burial 3 shows a predominance of Mounds characters but Pits features occur in over half of the tested traits. Burial 9's placement is decidedly with the Mounds physical variety but its skull and chin form resemble that of the Iroquois physical type. Burial 11 definitely has status with the Pits group and also resembles the Iroquois type. Individual 64,1a has a predominance of Pits features but is intermediate in chin form and, as in all the crania, shows the blurred subnasal margin of the Donaldson variety. This last feature, however, occurs with a high frequency in the later Pits people.

The preceding analyses suggest that the Surma population represents an intermediate physical variety that could very probably have occurred during the transition from Middle to Late Woodland times. The data further show a tendency toward the later period, and characteristic Iroquois morphology is in evidence.

#### DENTAL ANALYSIS

Analysis of teeth revealed congenital abnormalities, crowding, attrition, caries, and infection. Seven of 238 potential sites in the jaws show evidence of premortem tooth loss, while 24 teeth were lost after death. These figures amount to 0.9 per dentition in the former case and 3.2 per dentition in the latter. Premortem tooth loss reflects pathological processes and its low incidence at the Surma site is an indication of the generally good state of dental health.

Dental anomalies are most noticeable in the dentition of Burial 9. These have been described and include three-rooted lower molars, a double rooted mandibular premolar, and a peg-like mandibular premolar. The upper premolars have three roots and there is an unidentifiable deformed maxillary tooth.

The Carabelli's tubercle is present on 2 of 19 maxillary first molars only. Enamel extensions occur on molar roots in the following incidence:

Maxilla	M1	1/17	5.9%
	M2	7/16	43.7%
	M3	2/14	14.3%
Mandible	M1	2/18	11.1%
	M2	7/20	35.0%
	M3	4/18	22.1%

It can be seen that enamel extensions occur most frequently on second molars. The analysis revealed no side preferences.

One retained primary second molar is present in the maxilla of Burial 11. Crowding in the incisor region has been described in the dentition of this individual and in that of Burial 4.

The state of dental attrition and incidence of carious teeth give insight into the dietary tendencies of a prehistoric community. A high incidence of caries and low rate of attrition result from the soft diet of an agricultural population, while the opposite holds true for the harsher diet of a hunting and gathering society. Molar wear on the Surma skeletons was graded numerically as follows : 0 - no attrition ; 1 - cusps blunt; 2 - crown flattened ; 3 - dentin exposed ; 4 - pulp chamber opened. From this tabulation an average state of 2.21 was derived for the adult teeth. Dental wear is thus not very advanced for the population as a whole.

The incidence of carious teeth is 20/269 or 0.071; the percentage of affected tooth groups is: incisors 0.0, canines 10.0, premolars 10.0, and molars 80.0. As expected, the higher incidence of pit and fissure caries occurs in the molar region since the complication of cusps here offer more potential sites than in other tooth groups. Alveolar abscesses are present at the rate of 0.9 per dentition. In general, abscesses are secondary to pulp exposure, and in this series of dentitions, caries rather than attrition is the cause of opened pulp chambers.

Comparatively, the incidence of caries in the Surma population approaches, but is not equal to, the agricultural Pits group of people at Serpent Mounds — 0.1 (Anderson : n.d. 1). The state of dental wear is not as advanced as in the Middle Woodland hunters and gatherers of that site — 3.1. The caries incidence of this earlier group is 0.026. The Surma figures are thus suggestive of a stage in dental pattern somewhere in between these two groups, and may in fact be that of an incipient agricultural community.



Further comparative data in this respect are available from the Bennet site (Anderson: n.d. 2). This site has been assigned to the late Pickering branch of the early Ontario Iroquois tradition and has a radio-carbon date of 1260 - 1280  $\pm$  60 A. D. (Wright, 1966: 42). Dental analysis of this morphologically Iroquois population revealed a caries rate of 0.1-1 and manifests an agricultural economy.

From the data on all these populations, a gradient of caries incidence established itself as increasing in time from the Middle to Late Woodland periods:

Population	Caries Incidence
Serpent Mounds-Mounds (128 A.D.)	0.026
Surma (Middle to Late Woodland)	0.074
Serpent Mounds-Pits (Late Woodland)	0.100
Bennet (1260-80 $\pm$ 60 A.D.)	0.140

The dental situation, in conjunction with the transitional morphology of the Surma group, tends to substantiate the intermediate position of these people when compared to other populations in Ontario.

#### SKELETAL PATHOLOGY

Bone pathology is at a minimum in the Surma material. The few instances of minor trauma and possible infection have been described for the skeletons of Burials 7, 8, Ft.E 61,1a, and Ft.E/64,2b. Degenerative joint disease is also scarce in this relatively young population, although the very low sample of adequate surfaces for study renders incidence analysis unfeasible. Osteoarthritic joint surfaces are most notable on the skeletons of Burials 8 and 10. The disease is here manifested almost always by slight lipping, but in Burial 10 severe erosion as well as lipping has occurred on the acromial facet of the left clavicle.

Vertebral osteoarthritis occurs on 15.3% of superior articular facets and 8.3% of inferior facets in the cervical region : 25.0% and 31.5% of superior and inferior facets respectively on thoracic vertebrae ; and on 32.3% of superior and 9.4% of inferior lumbar facets. Only 3 superior sacral facets were available for study and none of these showed any evidence of disease. Osteophytosis is present on 8 of 17 cervical (slight), 5 of 19 thoracic (slight to marked), and 6 of 8 lumbar (advanced) vertebral bodies. Thirty of forty thoracic vertebral fragments which could be examined showed laminal spurring. Nineteen of these had spurs only on the inferior surface of the laminae, one only on the superior surface, and ten on both surfaces.

#### DISCUSSION

This osteological report of the Surma site skeletal remains has described the morphological, dental, and pathological features of a population consisting of twenty-two individuals. Comparisons have been

made with other prehistoric Ontario populations in morphological aspects and dental pathology. The following results are derived from these comparisons :

1. The Surma group shares basic physical characteristics with both early and late prehistoric peoples from Ontario.
  2. A test with 21 discrete morphological traits that differ significantly in incidence between Middle and Late Woodland skeletons does not place the Surma material entirely in one or the other category. Instead, this group falls somewhere in between with trait tendencies toward the later period.
  3. The incidence of carious teeth suggests an incipient agricultural economy when compared to that of other populations.
1. Continuous morphological characteristics, more often than not, are of the Iroquois physical variety.

The archaeological position of the Surma site, as mentioned in the introductory remarks to this paper, is still in flux. Emerson and Noble (1966: 81) feel that the discrepancies in dating may be an argument for the late trait survival of the earlier grave goods. At any rate, the context of the site is neither completely Middle or Late Woodland in time.

In the Serpent Mounds report (Anderson : n.d. 1), osteological traits in Ontario prehistory are shown to have undergone microevolutionary change through time. Percentage differences in these traits are most marked in groups which are widely separated in time, but as more populations in the intervening period are found and studied, the morphological continuity between the earlier and later peoples becomes more clearly defined. The Surma population is one such intermediate group.

It is also of interest that the Surma crania are indicative of Iroquois morphology and that the dental pattern at the site is that of an incipient agricultural community. In dealing with the problem of Iroquoian physical development, Anderson (Wright and Anderson, 1963:109) hypothesizes that the Donaldson physical type was ancestral to the Iroquois type. He further hypothesizes that a progressing diffusion to the east and south had its roots in an area which includes the Bruce Peninsula. Surma is later than Donaldson, and its geographical position, along with its morphological evidence, tends to support the hypothesis of Iroquois development from the north.

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