

DENTAL PATHOLOGY OF HUMAN REMAINS FROM AN ARCHAIC SITE

IN SOUTHERN SASKATCHEWAN

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"DENTAL PATHOLOGY OF HUMAN REMAINS FROM AN ARCHAIC SITE
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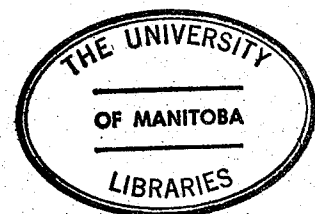
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CHAPTER I
THE GRAY SITE

Oxbow Culture

The diagnostic material trait of the Oxbow complex is a side-notched, basally-thinned projectile point (Syms, '70; Dyck, '70).

It was originally found and defined at the Oxbow Dam Site located near the Souris River in southeast Saskatchewan. This site was dated by radiocarbon to 5200 ± 130 years B.P. (Nero and McCorquodale, '58). Other evidence of Oxbow was found at the Long Creek Site, dated at 4613 ± 155 years B.P., 4643 ± 150 years B.P., and 4993 ± 125 years B.P. (Mayer-Oakes, '60), and the Connel Creek Site (Meyer and Dyck, '68), as well as the Moon Lake Site (4100 ± 90 years B.P.) and the Harder Site (3360 ± 120 years B.P.) (Dyck, '70). Oxbow points have been found in the region from south and central Alberta to southwest and central Manitoba as well as from a great variety of sites across Saskatchewan as far north as Turtleford (Dyck, '70).

Syms re-evaluated a number of side-notched, basally-thinned points morphologically similar to Oxbow that have been given other names. These include the McKean points from the site of that name in Wyoming (dated at more than 3287 ± 600 B.P.) (Mulloy, '54) and from the Edgar Site in Wyoming (Coe, '59), Site 48SH312 in Wyoming (Frison, '68), the

Sween-Taylor Site in Wyoming (called "jackass ear" points) (4960 \pm 180 years B.P.) (Syms, '69), the Mavrakis-Bentzen-Roberts Bison Trap in Wyoming (2600 \pm 200 years B.P.) (called Powers-Yonkee eared variation of McKean) (Bentzen, '66; Syms, '69), the Powers-Yonkee Bison Trap in Montana (4450 \pm 125 years B.P.) (called the Powers-Yonkee eared variation of McKean) (Bentzen, '66; Syms, '69), the Coulee View Site in Alberta (Syms, '69), the Avery Site in Manitoba (called McKean) (Joyes, '69), Mummy Cave of Wyoming (5610 \pm 280 years B.P.) (called McKean) (Syms, '70; Wedel et al., '68), and the Larter Site in Manitoba (called Parkdale Eared) (MacNeish, '58).

Oxbow points have been found in surveys in Manitoba in the Swan River region, the Rossburn-Verdon region, the southwestern region, and the Carberry region, and in Montana in the Havee region and the area north of the Missouri and east of the Milk Rivers and in the Sedgewick area of Alberta (Syms, '69). In Saskatchewan, they have been found at Indi, Dundurn, Norquay, Valley Centre, Edam, Turtleford, Biggar, Meota, Mortlach, Indian Head, McCod, and Lumsden (Dyck, '70).

An Oxbow point has also been found in level three of the East Pasture Site (EcNx-4). The radiocarbon date for level three is 4235 \pm 5 B.P. (Wilson, '72). This site is located approximately one and one half kilometers north of the Gray Site (Epp, '72). Ten sites out of sixty-one surveyed

in the area denoted EcNx (including the Gray and the East Pasture Sites) produced Oxbow points. A survey of the sites outside of the glacial spillway and lake area produced nineteen sites with Oxbow components (Epp, '72).

Because Oxbow projectile points are often found in association with McKean (Syms, '69, '70), a chronology of Oxbow in the plains is very difficult. Generally, Palaeo-Indian remains are found during the Anathermal, a period relatively cooler and moister (Hurt, '66), up to the beginning of the Altithermal 7000 years ago (Vickers, '70). At that time, with the drought and resulting lack of bison, there was a large migration of the Plains' groups into the Rocky Mountains of Alberta and British Columbia and the plateau to the west. This migration took place between 7000 and 6500 years ago (Husted, '69; Hurt, '66). At the end of the Altithermal and the beginning of the Medithermal, approximately 5000 years ago, the Plains and Mountain groups expanded into the western Plains (Husted, '69; Syms, '70; Wedel et al., '68). These groups included Oxbow, McKean, Duncan, and Hanna (Vickers, '70).

The Oxbow culture seems indicative of hunting and gathering technology. Lithic tools include projectile points, bifaces, end scrapers, retouched flakes, and drills. There were no ceramics (Dyck, '70). Worked bone and shell have been found (Foster, '72) and copper has sometimes been

found (Foster, '72; Steinbring, '70).

Various kinds of sites associated with Oxbow have been excavated: work sites, small camp sites (Dyck, '70), bison drives (Bentzen, '62; Syms, '69) and burial grounds (Foster, '72).

The size and type of these sites would imply small nomadic bands that occasionally came together to form larger groups, possibly on a seasonal basis. Subsistence activity included hunting of small game. Bison meat was roasted and the marrow extracted from the long bones (Mayer-Oakes, '67).

Situation and Environmental Factors

The Gray Site (EcNx-1a) is located in southwestern Saskatchewan, five kilometers west and six and a half kilometers north of Swift Current, on the farm of Mrs. Gray (Foster, '72). The area is moderately rolling to hilly (10% - 30% slopes on 40% or more of area) with brown aeolian soils (Moss and Clayton, '69; Dale and Paul, '72; Foster, '72; Moss, '65).

The site is situated on the south slope of a hill (Foster, '72) which borders on what was once a glacial spillway or meltwater channel (Kupsch, '69) for a large glacial lake extending from three kilometers northwest of the site to fourteen kilometers further north, and from five kilometers east to an unknown western border in Alberta (Epp, '72). Maximum water level is estimated to have occurred between 20,000 and 13,000 years ago. At this time the ice extended to the area of what is now the South Saskatchewan River (Epp, '72).

The present climate is Bsk (cold steppe) with a mean annual temperature range of 25-28 degrees C. in July, and 15 degrees C. in January, and a mean annual precipitation of 28-32 centimeters (Chakravarti, '69). Before agricultural practices were introduced, the area was primarily grassland (spear grass, blue gramma, and wheat grass) (Coupland and Rowe, '69) with some shrubbery and aspen groves concentrated

near streams and rivers (Ckakraarti,'69).

The open prairie area would have had such animals as bison, antelope, Richardson's ground squirrel, black-tailed prairie dog, white-tailed jackrabbit, coyote, and wolf. The grove areas would have black bear, grizzly bear, mountain lion, bobcat, elk, mule deer, white-tailed deer, snowshoe rabbit, bison, wolf, and coyote. A large number of birds, including waterfowl, would use these areas for breeding (Maher,'69; Epp,'72; Gallop,'69).

From the archaeological survey of the University of Saskatchewan in 1971, it was determined that the spillway or channel area was "intensively occupied during Oxbow times but the channel proper was less intensively occupied during later periods, with the main occupation areas having shifted towards the northwest where the banks of the valley are less steep" (Epp,'72).

The Gray Site was used during the Medithermal. In comparison with the hot, dry Altithermal which necessitated low population density, the Medithermal was significantly cooler and moister, with more numerous lakes, giving optimum conditions for re-establishing higher population density (Hurt,'66).

EXCAVATION PROCEEDINGS

In April 1963, Gray reported the discovery of a human cranium to the RCMP in Swift Current, who in turn reported the find to the Museum of Natural History in Regina. Kehoe led the summer's excavation and recovered approximately twenty-one individuals from an area about fifteen feet square (Foster, '72).

In 1969 Sponsel led a test excavation in which he unearthed thirty-five individuals in an area of about twelve square meters. Millar retested the site in September of 1969 and decided that the site was worth further excavating (Foster, '72).

The 1970 field season was supervised by Wilson who opened sixty-three one-meter squares and excavated twenty-one burial units. In 1971 Foster supervised the excavation of eighteen one-meter squares. Ten burial units were uncovered (Foster, '72). The 1972 excavations were led by Hammel. Eighteen burial units were removed. Finally in 1973 Ives led the excavation of about forty new burial units.

The radiocarbon dates for the site include: 3485 ± 195 , 3550 ± 295 , 3750 ± 180 , 3755 ± 100 , 4955 ± 165 , and 5100 ± 390 years B. P. (Millar, '73).

A burial unit may be defined as all of those remains of an individual or individuals that are buried together at

the same time. Several different types of burial units may be identified on the site as follows: single or multiple, secondary or primary. In addition to these two criteria further qualities may be distinguished as, for example bundle (single, secondary), circular (multiple, secondary), extended (single or multiple, primary), mass (multiple, secondary), and so forth. The Gray Site exhibits a great variety of burial types. Although Foster ('72) has developed a number of categories, further excavation has shown that several new categories must be added (see for example Burial 90).

Several artifacts have been found on the site other than Oxbow points. Shell beads and pendants, copper fragments, scrapers, and knives as well as worked bone tools have been found.

Animal remains include dog, pronghorn antelope, bison, eagle, and deer (Foster, '72).

CHAPTER II

GENERAL CONSIDERATIONS

Dental pathology in osteology is often defined to include pathologies caused by the actions of microorganisms such as carious lesions, abscesses, necrosis of the pulp chamber, and periodontal disease; pathologies due to environmental factors such as attrition and trauma; and pathologies due to neoplasms and genetic aberrations such as hyperdontia and root variation. It is beyond the scope of this thesis to deal with neoplasms and genetic aberrations.

Two of my original observations, lateral attrition and pitting, were later discarded. Lateral attrition, while it is a very common feature, fits in better with a study of occlusion. Pitting on the enamel was so common as to be close to 100% occurrence. This I felt was the result in most cases of abrasion due to soil conditions and weathering, rather than anything else.

This left the following observations:

1. 0 - absent
1 - present
2. 0 - unerupted
1 - erupted
3. reason missing
0 - probably post mortem - single tooth
1 - bone missing

- 2 - ante mortem - no reason
 - 3 - congenitally absent
 - 4 - periodontal disease
 - 5 - abscess
 - 6 - trauma
4. resorption
- 0 - none
 - 1 - slight
 - 2 - moderate
 - 3 - extreme
5. attrition
- 0 - unworn
 - 1 - enamel wear
 - 2 - dentine showing
 - 3 - dentine completely exposed
 - 4 - pulp exposed
 - 5 - crown gone
 - 6 - roots only
6. molar attrition
- 0 - indeterminate
 - 1 - normal
 - 2 - other
7. special cases
- 0 - absent
 - 1 - present

8. number of caries - occlusal
9. number of caries - mesial
10. number of caries - distal
11. number of caries - buccal
12. number of caries - lingual
13. number of caries - cementum
14. pitting
 - 0 - absent
 - 1 - present
15. abscess
 - 0 - absent
 - 1 - present
16. periodontal disease
 - 0 - absent
 - 1 - slight
 - 2 - moderate
 - 3 - severe
17. trauma
 - 0 - absent
 - 1 - post mortem
 - 2 - ante mortem - non-purposive
 - 3 - ante mortem - purposive

Individual mandibles and maxillae were identified by catalogue number when possible, and assigned an arbitrary number if not. Individuals, when possible to sort out, were

dealt with in total, rather than keeping the bones separate. This was not easily accomplished in the case of mass burials.

Diseases outside the scope of this study are thought to result from dental pathology (e.g.: osteoarthritis of the cervical vertebrae and shoulder area). Diseases that are thought to affect the incidence of those dental pathologies that I am studying (e.g.: malnutrition and enamel hypoplasia) are included in the discussion of the aetiology.

Age groups were defined as follows:

1. FETAL AND INFANT

These individuals were under two years of age at the time of death. Thus, the deciduous dentition had not yet fully erupted. No data were recorded from this age group. Because of the fragmentary nature of most of the individuals, and because no evidence of any pathologies had been recorded on any child, it was decided that the data on infant and fetal material would not alter the pattern of disease distribution in any way.

2. YOUNG CHILD

This age bracket covers the ages two to five, inclusive; that is, from the end of the final eruption of the deciduous dentition to, but not including the eruption of the first permanent molar. No sexual differentiation was possible in this group.

TABLE 2:1

	Complete	Mandible Only	Maxilla Only	Total
no.	4	15	9	28

3. OLDER CHILD

This age class includes children from six to twelve inclusive; that is, from the eruption of the first permanent molar, to, but excluding the second permanent molar. This is the stage of transition from deciduous to permanent dentition.

TABLE 2:2

	Complete	Mandible Only	Maxilla Only	Total
no.	5	11	5	21

4. ADOLESCENT

This age grouping refers to both adolescents and certain young adults, from the ages of twelve to approximately twenty. In other words, this group encompasses those individuals who have erupted second permanent molars, but do not yet have erupted third molars. This group is also the earliest one for which sexing data are available. The unsexed (U) category refers to a number of individuals, the majority of which came from surface collections and, as such, cannot be associated with post cranial material.

TABLE 2:3

no.	Complete			Mandible Only			Maxilla Only			Total
	M	F	U	M	F	U	M	F	U	
	2	8	1	0	3	5	2	5	1	27

ADULT I

This age category refers to young adults. The approximate age range is from twenty to thirty years. The group is characterized by the complete eruption of the third molar to the stage in attrition where the dentine is showing (stage 2). They have slight to no attrition on the third molar, slight attrition to dentine showing on the second molar, and from dentine showing to dentine completely exposed on the first molar, depending on the specific age. There were not enough data to indicate any significant differences between male and female rates of attrition, if they existed. Where possible, aging was also based on the post cranial material. The unsexed category (U) again refers mainly to survey material for which post cranial material was not available.

TABLE 2:4

no.	Complete			Mandible Only			Maxilla Only			Total
	M	F	U	M	F	U	M	F	U	
	18	2	0	4	1	12	3	2	6	48

6. ADULT II

These individuals are middle aged adults (roughly, from ages thirty to forty-five). In the molars, attrition ranges from dentine showing (stage 2) to dentine completely exposed (stage 3) on the third molar, and from dentine completely exposed to crown gone (stage 5) on the first molar. The anterior teeth range from dentine completely exposed to roots only (stage 6).

TABLE 2:5

no.	Complete			Mandible Only			Maxilla Only			Total
	M	F	U	M	F	U	M	F	U	
	3	3	1	4	2	4	4	1	4	26

7. ADULT 3

This group of individuals refers to old adults (approximately forty-five years of age and over). Attrition varies from stage 4 (pulp chamber exposed) to stage 6 (roots only). In most cases, one or more teeth have been lost before death.

TABLE 2:6

no.	Complete			Mandible Only			Maxilla Only			Total
	M	F	U	M	F	U	M	F	U	
	5	6	0	0	5	7	3	0	2	28

CHAPTER III

CARIES

Caries is the most significant of dental diseases, mainly because it is found in varying degrees in almost all human and animal populations from the time of the Permian.

The aetiology of caries is complex and, to fully understand it, basic histology is necessary. Each tooth is composed of a crown portion jutting above the gingiva and a root portion. The area where they meet is known as the neck and does not necessarily correspond to the gum line. The innermost part of the tooth itself is composed of dentine surrounded by a thin layer of enamel on the crown and cementum on the roots (Gardiner et al. '69).

It should be noted that this structure is unique to primates, and other mammals differ not only in the amount of various tissue, but also in their relative location.

Enamel is 99% inorganic salts and 1% protein. The structural unit is the enamel prism formed by a single ameloblast (cell responsible for enamel formation) that is oriented at right angles to the dentine, and crosses the entire width of the enamel in an irregular course. Between the prisms is interprismatic substance. Both prism and interprismatic substance are formed by apatite crystals in an organic matrix. Because the enamel is laid down in a rhythmic fashion, cut cross sectionally, the enamel will show

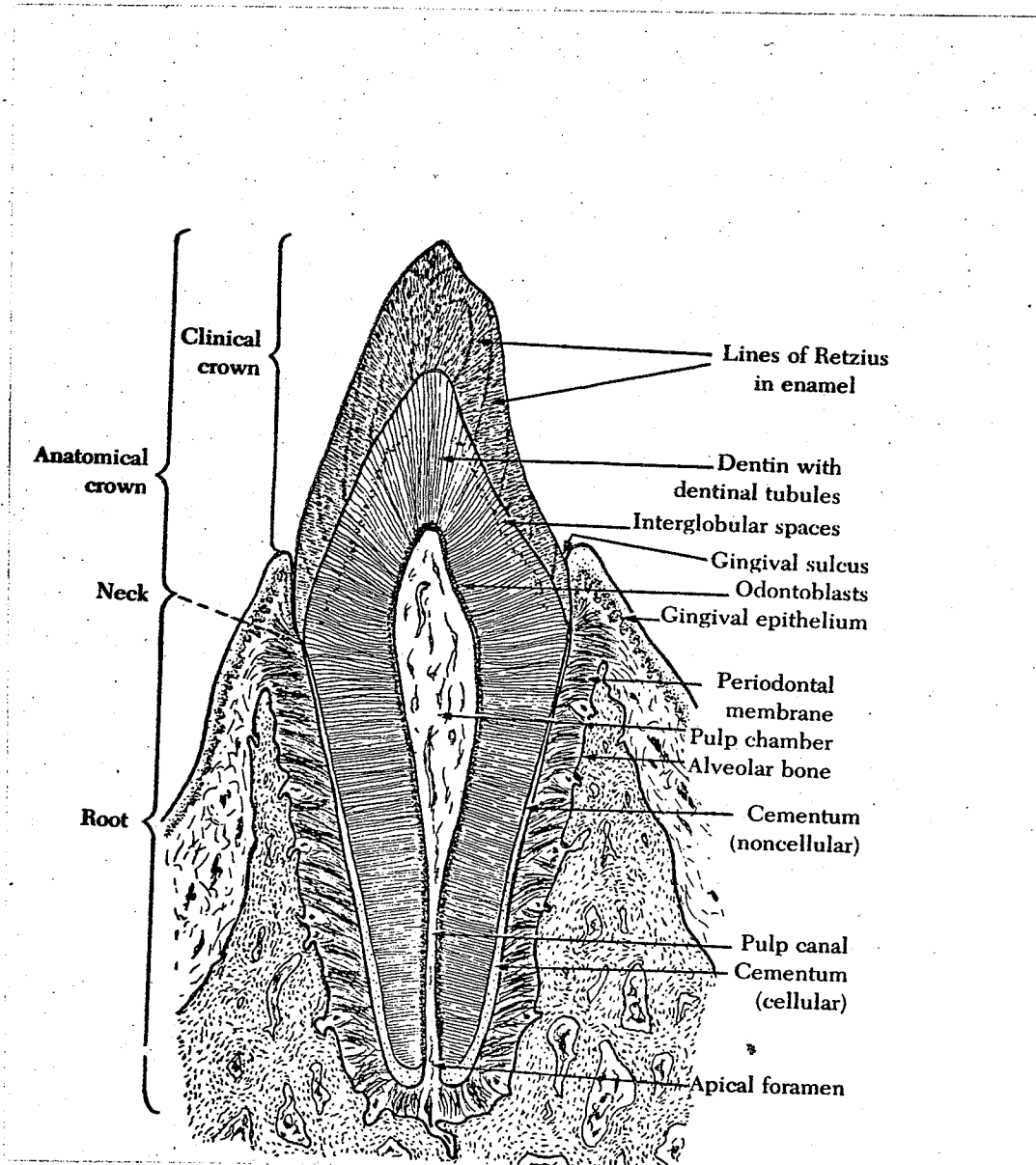
concentric parallel lines called the lines of Retzius (Leeson and Leeson, '70).

Dentine, on the other hand, is 72% inorganic salts, and 28% organic. Cross sectionally the tissue appears striated due to the many dentinal tubules which run roughly in an elongated "S" curve from the pulp cavity to the enamel or cementum. These tubules may branch out in the outer layers of dentine. The tubules are occupied by processes of odontoblasts which have been called Tome's dentinal fibres. Between these fibres is a meshwork of collagenous material embedded in a calcified ground substance. Surrounding the outside of the tubule is a relatively dense layer called the sheath of Neumann. Also, small areas of the dentine matrix remain incompletely calcified. These are known as interglobular spaces. Growth lines similar to the lines of Retzius are called lines of Owen (Leeson and Leeson, '70).

Secondary dentine is a substance similar to dentine. It is formed by any kind of stimulation of the odontoblasts, excessive wear of the crown, or irritation in the periodontal membrane. It has few tubules (Bhaskar, '61), but is extremely irregular in structure (Leeson and Leeson, '70).

There are nine stages in the formation of a carious lesion (Darling, '65):

LONGITUDINAL SECTION THROUGH
A LOWER LATERAL INCISOR
(x6)



ref: Leeson & Leeson '70:277