SWEETGRASS HILLS, MONTANA, USA

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Cover Photo: John Dormaar
EDITOR’S NOTE

For the first time in its history, the Review is taking the unusual step of publishing a supplement.

Some years ago, Dr. John Dormaar of the Agriculture and Agri-Food Canada Research Centre in Lethbridge, submitted to the Review a paper on the Sweetgrass Hills of Montana. As we all know, the Review went into hibernation for a couple of years, but we have now started publishing again on a regular basis and it was decided that it was time to get Dr. Dormaar’s paper in print. In the wait it had undergone a number of revisions and it was decided that it should be put out as a supplement to the April 1997 issue.

Our thanks to Dr. Dormaar for his patience. We hope that this supplement to the Review will serve in some small way to show the Society’s appreciation to Dr. Dormaar for his many years of support and work on our behalf.

Lesley Nicholls
Editor
"The Sweet Grass Hills stand out mistily against the sky-line when viewed in the early morning, are quite lost in the haze of the afternoon sun."

Anderson (1876)

"Seen from the north, the Sweet Grass Hills have a grand and majestic appearance from the contrast they present to the monotonous level of all the surrounding country."

Featherstonhaugh (1876)

"...Names strange to Ma but wild and sweet to the tongue ...A hundred miles behind him, when he turned to look, he could see the mantled nipples of the Sweet Grass Hills."

Guthrie, Jr. (1979)

INTRODUCTION

The Sweetgrass Hills, located in the northern part of Toole and Liberty Counties, Montana, USA, consist of three major buttes. They are enclosed within 49°00' and 48°45' north latitude and 111°00' and 112°15' west longitude. Meloy (1986) notes that although they are called hills collectively and buttes individually, they are actually mountains and the highest isolated peaks in the USA. They rise about 1,000 m (3,000 ft) above the surrounding prairie level. West Butte is 2,130 m (6,984 ft) above sea level, Middle or Gold Butte (called Centre Butte in Canada) is 1,969 m (6,456 ft), and the two summits, Mount Brown and Mount Royal (still called Mount Morris in 1891 as noted by Ross 1950), of the East Butte are 2,121 m (6,954 ft) and 2,107 m (6,908 ft) above sea level, respectively. Mount Lebanon and Black Jack Butte are part of the East Butte complex. Several other high points of significance include Haystack Butte and Grassy Butte.

The Sweetgrass Hills are in private ownership except for a few sections on each butte managed by the Bureau of Land Management. Nearly all of the country immediately surrounding the hills also is private property. The land in and immediately around the Sweetgrass Hills generally supports ranching.

Since the Sweetgrass Hills have long been recognized as a place of significant traditional historic value by the native inhabitants of the surrounding prairies of northern Montana and southern Alberta and Saskatchewan, the following overview traces the history of the names given to the hills over the last 200 years, examines the geology, flora and fauna, and touches on some of the evidence as to why these Hills are of such spiritual value to the Indian people.

NAMES

The Blackfoot name for the Sweetgrass Hills was Ká-to-yi-six (Holtermann 1985), while the Blood name was Kat-e-is (Dawson 1885). Schultz (1962) spelled it Kutoyisk, while McClintock (1910) spelled it Katoyisk. Sanderson (1965) called them Weetchka-skotch-ya. All of these names literally translate into "Place of the Sweet Pine", "Sweet Pines", "Sweet Pine Hills", or "Pine Needles Buttes." Subalpine fir (Abies lasiocarpa (Hook.) Nutt.) was used for incense in ceremonies. The name was mistranslated into Sweet Grass Hills.

The Sweetgrass Hills first appeared on a map prepared by Peter Pond for the United States Congress in 1775 (Johnston 1977, Justo and Schwab 1992). He called them "The Three Loaf Mounts." However, Pond never got any closer than about 1,000 km...
On February 7, 1801, a Blackfoot Chief, Ac ko mok ki or The Feathers, drew a map for Peter Fidler, a Hudson's Bay Company surveyor who had opened Chesterfield House at the junction of the Red Deer and South Saskatchewan Rivers in 1800 (Moodie and Kaye 1977). This map depicted the Rocky Mountains and adjacent plains for a distance of some 800 km (500 miles) to the south of the exploration frontiers established by Fidler in 1792-93. On this map was a feature called "Cut to yis" or "The Three Paps." Then, in 1802, an even more detailed map of the region, including main Indian trails and overnight campsites, was obtained by Fidler from Kioucus (or Little Bear, a Blackfoot Chief). All this information was subsequently sent to London where it was incorporated into the 1802 Arrowsmith map of the region (Ruggles 1987; Beattie 1985b).

On June 5, 1805, Captain Meriwether Lewis sighted the Middle Butte from the Marias valley and, because of its conical shape, called it "Tower Mountain." However, on the return of the Expedition from the Pacific on July 19, 1806, Lewis sighted all three buttes and called them "The Broken Mountains." Lewis was aware that his "Tower Mountain" of 1805 was one of "The Broken Mountains" of 1806.

Fidler's Chesterfield House, closed in 1802, reopened in 1822. In November of that year a trader named John E. Harriott (1860, MacGregor 1978) visited the Sweetgrass Hills, climbed one of them and shot a Rocky Mountain sheep. Harriott called the hills "The Sugar Woods Mountains," obviously his translation of the Blackfoot name.

By 1832, Hudson's Bay Company traders at Fort Edmonton were referring to the Hills in correspondence as "The Sweet Grass Hills," although the latter seem to have been shown on maps of this and a later period as "Les Trois Buttes," often Anglicized to "The Three Buttes," probably so-named by French-speaking Metis bison hunters from the Red River. The Stevens Expedition of 1853-54 referred to them both as "The Sweet Grass Hills" and as "The Three Buttes." A map used in making the 1855 Treaty between the Blackfeet and the United States (Ewers 1944) and a map produced by Hayden (1868; Raynolds 1868) in the report of his voyages in 1859 and 1860 still carried "The Three Buttes." Schultz (1962), in a story explaining the presence of bison skulls on Chief Mountain, referred to the Sweetgrass Hills as "The Pine Needle Buttes."

The name "The Sweetgrass Hills" appeared to become current about the late 1860-early 1870s. Although "Three Buttes" still appeared on W. W. DeLacy's 1867 map made for the Montana Territory official use, "Sweet Grass Hills" was shown on his 1875 map. Captain John Palliser, in 1859, called them "Les Trois Buttes" when he sighted them from the Cypress Hills in July of that year. However, the general map of the routes in British North America explored by the expedition under Captain Palliser published in 1863 carried the name of "The Three Buttes" (Javorski 1983). Conversely, members of the North West Mounted Police in 1874 referred to them as "The Sweet Grass Hills." Dawson (1875), a member of the Canadian contingent of the 1872-74 Boundary Survey, referred to them as "Les Montagnes du Foin de Senteur," a name he said he obtained from Metis employees of the Survey. However, he also noted that the traders of the Missouri River region called them "The Sweet Grass Hills."

Alexander Staveley-Hill, a British MP, who owned the Oxley Ranch west of present-day Stavely, tells in his journal of a journey in 1882 from Fort Walsh westward: "We began descending a very steep hill (out of the Cypress Hills), obtaining a view in the distant south-west of three high peaks, which Guillaume, a Metis in my employ, called 'les buttes de foin scenté' (or, as they are called in English, 'sweet-scented grass hills'), so named from a grass which grows there with which the Indian scent all their articles of clothing and above all their medicine bags. It has a scent like dried wood-rufe" (Hill 1887).

A Lt. S. R. Robertson, while making a trip in 1885 or 86 from Fort Assiniboine (Havre) to St. Mary Lakes, drew a map on which the West Butte of the Sweetgrass Hills was identified as Mt. Jean. Jean Gill was the bride of Lt. George Ahern (Holterman 1985).

Today, the official designation is "The Sweetgrass Hills." The running together of the two words likely the result of a policy decision by the United States Geographic Board Names Division.

GEOLOGY

Throughout Palaeozoic (570 to 245 M years ago) and Mesozoic (245 to 66M years ago) times, the area now politically designated as Alberta and Montana, was low-lying and relatively flat and level. Seas repeatedly invaded the region as a result of small changes in elevation of land in relation to sea (Perry 1962). Many groups of sediments were deposited. In the Sweetgrass Hills, the oldest visible member of the sedimentary series is the Madison Limestone Formation (Madison Group) of Mississippian age (Palaeozoic Era). The youngest member is the Judith River Formation (Montana Group) of Upper Cretaceous age (Mesozoic Era). The strata above the Mississippian and below the Cretaceous Periods, representing the Pennsylvanian, Permian, Triassic, and Lower Jurassic
Periods, are missing. The area was elevated by a broad gentle uplift in which the strata of these Periods were slightly domed or arched upward. This uplift is known as the Palaeozoic Sweetgrass Arch. Erosion planed the uplifted area eliminating the sediments of the above mentioned four Periods. The present Sweetgrass Arch appears to be a reoccurrence of the larger arch which developed at the end of Palaeozoic times (Perry 1962).

Evidence for marine invasion during the Late Cretaceous Period was established by Lang and McGugan (1988). They sampled a 263 m (855 ft) thick Cretaceous (Colorado Group) outcrop section near Mount Lebanon for foraminifers. Based on the identification of these foraminifers, the depositional paleoenvironment was interpreted to be a hypersaline tidal flat-marsh-lagoon.

The buttes, on the eastern flank of the Sweetgrass Arch, originated from an igneous intrusion which uplifted overlying sedimentary strata, later stripped off through erosion. Weed and Pirsson (1895) and Kemp and Billingsley (1921) considered the Sweetgrass Hills to be the result of laccolithic intrusions. Their stylized cross-sections of the three main buttes represent the masses of porphyritic rock at the centres of the buttes as eroded laccoliths. Conversely, Truscott (1976) believes that the structure of the igneous core of East Butte at least is better described as a group of sills and dikes and some small stocks, rather than as a group of laccoliths. Much of the radial disturbance, faulting, doming of sedimentary strata, and radial fracturing in this area can be attributed to the intrusion of a stock of pyroxene syenite about 6.5 km$^3$ (1,600 acres) in area and at least 4,500 m (14,787 ft) in thickness. This was probably the formative event for the hills. Most of the other major intrusions occur as sills within sedimentary rock near this stock (Lopez 1995).

Based on K-Ar age determinations of four igneous rock samples, Marvin et al. (1980) determined the age range to be from 53.6 to 49.8 million years. The oldest age is from West Butte, suggesting that the intrusive sequence of West Butte is older than that of East Butte. The youngest age is from an aplite dike in the Ribbon Gulch area of East Butte. Baadsgaard et al. (1961) gave an age of 49.7 million years (re-calculated) for biotite from an isolated mafic dike at Pinhorn Butte, Canada, 17.5 km (11 miles) north of East Butte. Kemp and Billingsley (1921) noted a general change in chemical composition from more mafic rocks in the west to more alkali-rich rocks in the east. The intrusive time span for East Butte is at least 2 million years (Marvin et al. 1980).

Dawson (1875, 1885) was one of the first geologists to observe the dip of the sedimentary beds away from the summits of East and West Buttes, the presence of radiating dikes of eruptive material, and the plate-like fragments of hornblende trachyte covering the higher summits. The Madison Group (Mississippian Period) and Colorado Group (Cretaceous Period) sedimentary rocks dragged up by the rising magma wrapped around the igneous core. The Madison Group (Mississippian Period) is the most conspicuous feature. It forms the high ridges and steep cliffs of white rock that surround the much younger igneous intrusion (Alt 1986; Lopez 1995).

Erosion of the Sweetgrass Hills uplift exposed formations which were buried under later deposits for scores of kilometres (miles) in every direction (Kemp and Billingsley 1921; Cannon 1966; Meldahl and Rice 1966). Thus the stratigraphic sections which can be measured in the Sweetgrass Hills form a very valuable connecting link in the knowledge of these formations. Recent studies (Leckie and Cheel 1989) have indicated that the coarse boulder conglomerate comprising the Cypress Hills Formation in southern Alberta and Saskatchewan was re-sedimented during the Oligocene magmatic intrusions originating in the Sweetgrass Hills and Bearpaw Mountains of northern Montana.

The typical rock of these intrusions consists of large and blocky crystals of feldspars scattered through a matrix of microscopic crystals of feldspars, quartz and a variety of black minerals. The large and complex masses of light-coloured igneous rocks crystallised almost entirely at depth (Alt 1986). Technically, the rocks are varieties of porphyritic syenite. Graham (1935) and Stewart (1959) described the presence of narsarsukite \([\text{Na}_2(\text{Ti},\text{Fe})\text{Si}_4\text{O}_{11}]\) in East Butte.

The intrusive material often contains gold at levels far higher than igneous rocks ordinarily contain. Some of these igneous intrusions lost much of this gold to the older rocks that surround it, forming rich vein deposits that have been mined. Placer gold was discovered in Middle or Gold Butte in 1883 by a Rodney Barnes and three friends (Davis 1962). They founded the town of Gold Butte. Nicknamed Two Bit Gulch, its prospects faded quickly, and the town slipped into oblivion nearly as fast as it rose (Meloy 1986). The postoffice, established in 1895, was closed in 1945 (Cheney 1983). The total yield of placers was probably no more than 56.8 kg (2,000 ounces) of gold. Gold-lode deposits are also present in the Devil's Chimney area of East Butte (Gavin 1991).

Fluorspar or fluorite occurs mostly as replacement bodies along with quartz and minor pyrite in Madison (Mississippian) limestone. The largest occurrence, and at that few of the exposures contain fluorite with a tenor in excess of 40% of CaF$_2$ (Ross 1950), is found near the headwaters of Tootsie Creek (East Butte) in an altered and marbleised limestone adjacent to igneous
masses (Truscott 1975). Generally, fluorite is light to dark purple, but in places where it has been extremely weathered, it is black. The Tootsie Creek deposits are yellowish in colour because of alteration of associated pyrite to limonite.

Iron ore occurs on East Butte in beds up to 15 m (50 ft) wide over a surface length of 210 to 240 m (700 to 800 ft). Samples assayed about 60% iron and contained some copper, lead, zinc and silver. Ledoux (1891) examined iron ore prospects in 1890. The best iron deposits occur on claims patented in 1896. Although the claims have been worked intermittently, it is doubtful that any ore was ever shipped (United States Department of the Interior 1987).

On West Butte, igneous intrusions into formations containing coal beds, have locally metamorphosed the seams to semi-anthracite grade (United States Department of the Interior 1987). At the McDermott Mine a 60 cm (2 ft) seam has been mined for local consumption. Currently there is no coal mining in the area.

The Sweetgrass Hills also include two smaller hills, Grassy and Haystack Buttes. They are examples of an igneous intrusion called diatreme (Hearm 1968; Truscott 1975; Alt 1986). Diatremes are produced by gas-rich eruptions of alkalic ultramafic magmas that could have come along from deep beneath the earth's crust. They are cylinders a few hundred metres (feet) in diameter, stabbed vertically through the earth's crust. Although diatremes often contain sapphires, none have been found so far in Montana.

There are seven examples of the "Sweet Grass Intrusives" in Canada (Russell and Landes 1940; Kjarsgaard 1994). The Canadian occurrences are the extreme northern offshoots of the West and East Buttes. Of the potassium-rich magmatic rocks, the occurrence associated with the West Butte is classified as diorite porphyry, while the six offshoots associated with the East Butte are classified as minettes. The bodies all take the form of dykes, except for a boss-like minette plug which forms the eminence called Black Butte. Although all seven outcrops consist of intrusive rocks, part of one of the dykes contains the only bonafide occurrence of extrusive rocks in the Sweetgrass Hills. The economic potential (diamond and gold) of the latter is, nevertheless, considered to be low (Kjarsgaard 1994).

Devil's Chimney or Sweetgrass Wind Hole (Campbell 1978), located at the head of Tootsie Creek on the east side of East Butte, formed in solution breccia of the Mission Canyon Formation (the upper member of the Madison Group). This Formation consists of massive brown to dark-gray dense or finely crystallized limestone or dolomitic limestone that weathers light gray. The Mission Canyon is nearly pure carbonate. The lack of silt and silica impurities and the massive nature make it an ideal rock for cave development (Campbell 1978). The entrance of Devil's Chimney is a 15 m (49 ft) vertical pit that leads to two small rooms that reach a depth of 20 m (67 ft). A second entrance at the base of the pit connects to the cliff outside (Campbell 1978). Another small cave, Cave-With-Seven-Rooms or Seven Rooms Cave, in the East Butte area is at the head of Sage Creek (Campbell 1978).

The earliest advance of Laurentide ice into northern Montana may have occurred during "pre-classical" Wisconsinan (Elkwater drift of Westgate 1968 and Advance No. 1 drift of Lemke et al. 1965). The ice sheet was approximately 300 m (1,000 ft) thick in the vicinity of the Sweetgrass Hills and left the hills as nunataks about 600 m (2,000 ft) above the ice surface. Following an interstadial, the second major advance occurred about 22,000 years ago (Wild Horse drift of Westgate 1968 and Advance No. 2 drift of Lemke et al. 1965). Three separate ice lobes moved into Montana. The centre lobe advanced around the east side of the Sweetgrass Hills and was split into sublobes by the Bearpaw and Little Rocky Mountains. The westernmost lobe advanced around the west side of the Sweetgrass Hills, but left no well-defined terminal moraine. Till was deposited to an altitude of approximately 1,485 m (4,950 ft) along the north flank of West Butte (Calhoun 1906; Alden 1932; Perry 1962; Lemke et al. 1965, Westgate 1968).

The Sweetgrass Arch separated the drainage systems of the ancestral Missouri and South Saskatchewan river systems. Streams drained to the northwest and southeast. However, during deglaciation of the Laurentide ice sheet, meltwater streams cut several large channels into the glacial deposits and the bedrock across the divide. The Milk River Canyon originated as such a meltwater channel (Ross 1950; Perry 1962; Broscoe 1965).

Dowling (1915) concluded that the Milk River sandstone (the basal member of the Upper Cretaceous Eagle Formation) might be an artesian aquifer in a large area of southern Alberta. In 1916, the Federal Government of Canada drilled three wells to test this theory. The results were successful and soon thereafter large-scale development began. By 1937, 250 water wells were producing from the Milk River sandstone. Since not all water that is pumped from the aquifer comes from storage, recharge must take place. Dowling (1915) concluded that the outcrop area along the Milk river was responsible for the replenishment of the aquifer. Meyboom (1960) has shown, however, that this is only partially true. That is, the Sweetgrass Hills are the actual main intake area of the Milk River sandstone. This sandstone, together with older Cretaceous and Jurassic strata, has been uplifted by the Sweetgrass Hills' intrusions and is exposed, at elevations between 1070 and 1370 m (3508 to 4492 ft) above sea level, in
ringlike outcrops around these intrusions. Via chlorine 36 dating, the water ages near the distal end of the aquifer has been estimated to be more than 2 my (Phillips et al. 1986).

Not only do the Sweetgrass Hills have a distinctive physiography, they also have a distinctive climate. Old timers claimed that if a cloud hovered over West Butte, there would soon be a change in the weather (Campbell 1959). Since the hills rise abruptly above the surrounding region, moist air masses advancing from the northwest are forced to rise as they approach the northern slopes. This often results in orographic rainfall. This phenomenon was already noted by Dawson (1875). The average precipitation at Gold Butte (Gieseker 1933) from 1905 to 1929 was 354 mm (13.95 inches) while that at Chester, south of the hills, from 1900 to 1929 was 173 mm (10.73 inches). The driest and wettest years at Gold Butte during that period were in 1918 with 172 mm (6.76 inches) and in 1906 with 614 mm (24.17 inches), respectively. Snow depths averaged 953 mm (37.5 inches). The higher altitudes also result in cooler temperatures, which in turn reduce the rate of evaporation. Consequently, springs are relatively abundant and creeks radiate out onto the prairies from the Hills.

SOILS

Based on a map scale of 1:2,500,000, the soils around the Sweetgrass Hills belong to the Spring Creek-Blaine-Bearpaw Association. The Spring Creek (Haploboroll) and Blaine (Argiboroll) soils are formed on the steep broken uplands and the rolling and steep areas, respectively, of the unglaciated portion of the hills, while the Bearpaw (Argiboroll) soils are formed on the clay loam till of the undulating plains around the hills (Southard 1969). Soils of Toole and Liberty Counties were initially described by Gieseker (1933). A more detailed classification for the Sweetgrass Hills per se (United States Department of the Interior 1995) allows descriptions for each Butte separately. The Hills provide for unique and limited soil series developed on the igneous bedrock.

The East Butte area is steep and dissected by deep drainages. Most of the Butte (about 80%) is on slopes greater than 25%, with most slopes between 40 and 50%.

The igneous scree or talus areas are virtually free of vegetation except for lichens. Elve, very cobbly loam soils on North slopes produce forest vegetation with a limited grassed understory and are adjacent to and within the talus slopes. These deep, excessively well-drained, cobbly soils have 35 to 60% rock fragments by volume.

Adjacent to the igneous laccolith material are the shallow Winspect cobbly loam and moderately deep, Winspect, cool phase cobbly loam soils over limestone on ridges and convex slopes associated with the limestone bedrock outcrops. This soil produces sparse grass and forest vegetation of lesser quality.

The surrounding footslopes below East Butte are dominated by Roy and Barkof clay soils formed on sedimentary clay shales. The surrounding till plain is represented by Vida-Williams-Bearpaw soils formed in till.

The Middle Butte area is steep and dissected by deep drainages. Most of the land is on slopes greater than 25%, with most slopes between 40 and 70%.

The igneous scree or talus areas are virtually free of vegetation except for lichens. Most of the Middle Butte area is occupied by Perma and Whitlash cobbly loam soils on the 25 to 70% slopes which produce limited grass and shrub vegetation and are adjacent to and within the talus slopes. Perma cobbly loam soils are deep, somewhat excessively well-drained, and have 35 to 60% cobbles and stones by volume. Whitlash cobbly loam soils are shallow, well-drained soils over shattered igneous bedrock, have 35 to 60% cobbles and stones by volume.

The large adjacent areas on the 8 to 25% slopes are dominated by the Perma gravelly loam soils.

The surrounding footslopes below Middle Butte are dominated by Roy and Barkof clay soils formed on sedimentary clay shales. The surrounding till plain is represented by Zahil-Zahl soils formed in till.

The West Butte area is steep and dissected by deep drainages. Most of the land is on slopes greater than 25%, with most slopes between 40 and 70%.

The igneous scree or talus areas are virtually free of vegetation except for lichens. Areas of Stemple soils on north facing slopes produce forest vegetation with a limited grass understory. Stemple soils are very deep, well-drained, have 35 to 60% cobbles and
stones by volume. Most of the West Butte area is occupied by *Perma* and *Whilash* cobbly loam soils on the 25 to 70% slopes which produce limited grass and shrub vegetation, are adjacent to and within the talus slopes. *Perma* soils are deep, somewhat excessively well-drained, and have 35 to 60% cobbles and stones by volume. *Whilash* soils are shallow, well-drained soils over shattered igneous bedrock, have 35 to 60% cobbles and stones by volume. Adjacent areas on the 8 to 25% slopes are dominated by the *Perma* soils.

The surrounding till plain below West Butte is dominated by *Vida-Williams-Bearpaw-Zahl* soils formed in till.

**FLORA**

Tinkman (1855) visited the “Three Buttes” on September 6 and 7, 1853. He climbed the summits of two of the “Three Buttes” and found these hills to be covered half with grass and half with conifers. Ecologists consider the Sweetgrass Hills a habitat island - an isolated patch of montane habitat, because of their higher elevation which gives rise to lower temperatures and increased precipitation, surrounded by very dissimilar habitat, i.e. semi-arid grassland (Thompson 1986).

The peaks support montane plant communities, which have their closest counterparts in the Cordilleran Rocky Mountains over 140 km (90 miles) to the west. Botanical studies have been made by Dawson (1875) and Chickering (1878). However, the most detailed study of the montane and subalpine flora of this isolated mountain range, and particularly of the East Butte, was carried out by Thompson and Kuijt (1976).

Although the montane forests occupy an extremely small area, they are surprisingly rich in coniferous tree species, as they have representatives of seven taxa (including one hybrid). This, according to Thompson and Kuijt (1976), indicates that a montane coniferous forest belt, in addition to a boreal forest belt, followed the retreating Laurentide ice sheet as it left the area at the close of the Wisconsinan glaciation. A lack of typical subalpine understory species indicates a shift to a climate no longer favouring the relict subalpine forest communities.

The moist north-facing slope of Mount Royal, East Butte, where outcrops of Madison limestone have produced calcareous soils, harbours the rare, and possibly relict, arctic-alpine green sorrel (*Rumex alpestris* Scop.) Love but often reported as *R. acetosella* L.). Similarly, the rare spiked woodrush (*Luzula spicata* (L.) DC.) is found on the moist montane and subalpine grasslands of both East and West Buttes (Thompson and Kuijt 1976).

The unique geography of the Sweetgrass Hills made them also an important source of various economic plants, such as 'wild potato' (Flannery 1953) or western spring beauty (*Claytonia lanceolata* Pursh.), buffalo berry (*Shepherdia canadensis* (L.) Nutt.), choke cherry (*Prunus virginiana* L.), huckleberries (*Vaccinium spp.*), raspberries (*Rubus spp.*), Saskatoon berry (*Amelanchier alnifolia* Nutt.), arrow-leaved balsam-root (*Balsamorhiza sagittata* (Pursh.) Nutt.), western snowberry (*Symphoricarpos occidentalis* Hook.), nodding onion (*Allium cernuum* Roth), and strawberry (*Fragaria virginiana* Duchesne). A green paint came from the scum, consisting of green algae such as *Spirogyra* and *Cladophora*, of sloughs in the vicinity of the Sweetgrass Hills (McClintock 1910).

The hills were also a source of ceremonial plant species, such as sweet pine (*Abies lasiocarpa* (Hook.) Nutt.) and sweetgrass (*Hierochloe odorata* (L.) Beauv.). Cooper (1957) noted that "for ritual smudge or incense, the dried needles of the 'sweet pine' (nibiyate), were exclusively used, in accordance with directions given the original first keeper of the Feathered Pipe." Lieutenant Francis Vinton Greene, assistant astronomer and surveyor with the United States International Boundary Commission in 1874, observed that "most of the lush grass around the base of the hills is very nutritious, but some of it is very distasteful to animals, having a peculiar rounded stem, a sweetish taste like sugarcane and a peculiar odor" (Parsons 1963).

Even though Kàto-ji-six meant "Sweet Pine Hills", Campbell (1959) relates a legend in which

"In the early days before the Indians settled on reservations, certain tribes of the Plains Indians made pilgrimages each year to the Sweetgrass Hills to gather the sweet-scented grass for their ceremonials. The Indians would climb the highest hill for that was the closest to the Great Father's Universe. There the cleanest, warmest and freshest wind blew and the purest rain bathed the grass where it basked in the brightest sunshine. Carefully, the sweetgrass was gathered and carried to camp and entrusted to the Chief. This precious grass became the incense to be used on the altar fires."

FAUNA

The Sweetgrass Hills were well-known for the presence of a wide variety of game, such as mountain sheep, bison (*Bison bison bison* L.) and pronghorn (*Antilocapra americana* Ort.) (Tinkman 1855; Harriott 1860; Ewers 1950; Dempsey 1971; Bonnichsen and Baldwin 1978).

A journal entry by Lieutenant Francis Vinton Greene (1874) commented on the presence of mountain sheep in the Sweetgrass Hills:

"The Sweetgrass Hills were quite full of the Rocky Mountain sheep. They are about as large as a large deer, of a light dun color and have immense horns shaped like those of a goat. A pair that Lieut. Townsend got were four inches in diameter at the base and 28 inches long. Their hair is in texture almost exactly like that of an antelope and altogether they seem to be a mixture of goat, sheep, deer and antelope. They have a great fondness for running up rocky hills, but are not difficult to kill; by climbing the ridges and then approaching through brush, one can get very close to them, and when disturbed they always ran up hill. The meat is very good though the mutton taste is not very distinct."

It should be clarified, however, that the sheep present in the Sweetgrass Hills before the arrival of the settlers were the now extinct subspecies of mountain sheep (*Ovis canadensis auduboni* Merriam) or Audubon's bighorn sheep. It is not known when the last Audubon's bighorn passed from the scene, but small herds may still have been in the Sweetgrass Hills as late as the 1920s (Thompson 1986).

Grinnell (1876) noted two years later that "on the Sweet Grass Mountains, which are covered for half their height with a talus of platter-like blocks of trachyte, the bighorn or mountain sheep (*Ovis montana* Cuv.) in their passage up and down the sides of the hills have worn regular paths among and over the loose blocks..." Since the bison often climbed the hills to get away from the black flies (Milk River District Historical Society 1975), both bison and mountain sheep may have synergistically created the paths still visible across the rocks.

John Mix Stanley, in 1853, sketched Piegan hunting bison near the Sweetgrass Hills (Ewers 1958). In 1870, Kootenai Brown related that he "has stood on top of the Sweetgrass Hills and, as far as he could see in all directions was a living mass of buffalo" (Rodney 1969). Captain W.J. Twining, chief astronomer and surveyor with the United States International Boundary Commission, while standing at an elevation of 550 m (1,800 ft) above the plains on one of the three Sweetgrass Hills, in the month of August, 1874, "saw the front of a great herd moving south, and was unable to see the end of it in either direction." He considered the Sweetgrass Hills in the Blackfoot country to be the centre of the feeding ground of the great northern bison herd which ranged from the Missouri River northward to the Saskatchewan (Ewers 1958; Parsons 1963). Similarly, Colonel James Macleod of the North West Mounted Police sighted 70 to 80 thousand bison near West Butte, while on his way to Fort Benton, on September 23, 1874. Earlier, on his way to the Sweetgrass Hills on September 15, 1874, he had already seen bulls, cows, and calves dotting the plains as far as he could see. Colonel Macleod was so impressed by the huge shaggy animals that he conceived the appropriateness of including a buffalo head in the monogram or crest of the North-West Mounted Police, and later recommended it in a report to Ottawa, which was adopted (Turner 1950; Liddell nd). For further information on the relationship of the North West Mounted Police and the Sweetgrass Hills, see Appendix 2.

There is a footnote, however, to this bison herd from around the Sweetgrass Hills. In 1873, Walking Coyote (aka Samuel), a Pend d'Oreille Indian, was hunting in the Sweetgrass Hills and captured four bison calves. These came eventually into possession of the Mission of St. Ignatius on the Flathead Reservation in western Montana. By 1884 these had increased to 13. Ten of these were purchased by Michel Pablo and C.A. Allard. In 1893 they bought 26 more from a small herd in Omaha. The descendants of this group of 36 animals were the bison purchased (475) by the Canadian Government in 1906 (MacGregor 1954; Young 1965).

Wolves (*Canis lupus* L.) were also plentiful at that time. However, by 1884, a party of Piegan found and killed only four lone bison; they were the last bison in the Blackfoot country (Ewers 1968). By 1877, the wolves had become scarce as well (Rodney 1969). Today, the hills support mainly populations of wapiti (*Cervus canadensis nelsoni* Bailey) and mule deer (*Odocoileus hemionus hemionus* Rafinesque).

Numerous faunal remains, some of which exhibited modification, have been recovered from Devil's Chimney cave during preliminary investigations carried out by Montana State University. This cave has the potential to contribute important information to the palaeo-environmental record on the northern Plains. A bear skull has been recovered from Deer Creek, northwest of West
Butte (Graspointner 1980).

Grinnell (1876) observed that "crows (Corvus americanus Aud.) were extremely abundant on the streams flowing out of the Sweet Grass Hills." The south facing cliff of West Butte is a primary peregrine (Falco peregrinus) hacking site (United States Department of the Interior 1987).

Ladybird beetles (Hippodamia quinquesignata Kirby) are common predators of aphids. In autumn, the beetles move from the prairies to aggregation sites in the mountains (Harper and Lilly 1982). The aggregation sites are usually located on upper, exposed slopes that contain little vegetation and are covered with flat rocks that are lying on the surface but have open areas beneath into which the beetles can crawl. The sites are generally more exposed, and are usually free of snow earlier in the spring than the surrounding areas. In spring, mating activity occurs before dispersal of the beetles from the aggregation sites. The Sweetgrass Hills have several such aggregation sites which are all exposed and snowfree in spring.

**CULTURAL**

Native Americans, who lived and hunted on the northern Montana Plains, included ancestors of, among others, Assiniboin, Blackfeet and Plains Cree tribes. These tribes remain in the vicinity today. Featherstonhaugh (1876) noted that "the Plains between Milk River and the Three Buttes are a sort of neutral ground between the Indian tribes, and are generally left unoccupied by them; the Sioux and Assinebonies do not appear to cross to the west bank of the stream and the Blackfeet, who cling to the skirts of the Rocky Mountains, rarely approach the Buttes. As a consequence, perhaps, of this state of things, this strip of country was full of buffalo."

A number of accounts specifically record the presence of Native American peoples in the Sweetgrass Hills (Uhlenbeck 1911; Cooper 1957; Ewers 1958; Flannery 1958; Schultz 1962; Canada Heritage Foundation 1988). The map drawn by the Blackfoot Chief, The Feathers or Ac ko mok ki, and dated 7 February 1801, is probably the best known of the Indian maps recorded by Peter Fidler (Beattie 1985a). The finished version of the map, "reduced ¼ from the original size" by Fidler, was sent, with several other maps, to the Governor and Committee of the Hudson's Bay Company in London, England, with his letter of 10 July 1802. However, Beattie (1985a) notes that in his "journal of explorations" written later while wintering at various posts, Fidler records an event not mentioned on the copy sent to London. In his covering letter, Fidler had noted that The Feathers was acquainted with the land near the Rockies because "the Blackfeet traverse those parts every year in their war parties". On 30 November, 1800, some 175 young Blackfoot set off from Chesterfield House to war against their old enemies the Snake (Shoshoni) Indians. Although their raid was unsuccessful, Fidler had carefully traced in his notebook the "war track in 1801" (Beattie 1985a). The "track" ran just west of West Butte both on the way out and coming back. Another map by The Feathers, transcribed by Fidler and dated February 1802 in his notebook, showed that the Sweetgrass Hills ("3 paps") were "3 nights" travel from the Rocky Mountains (Beattie 1985a). Archaeologically significant tipi ring campsites can still be found near the bases of the various Buttes. Ruebelman (1983) prepared an extensive overview of the archaeology of northern Montana.

At the mouth of the Judith river on October 16/17, 1855, Isaac I. Stevens concluded a treaty with the Blackfeet Nation (Ewers 1944, 1958). The Blackfeet Chiefs, led by Lame Bull, agreed to limit themselves to an exclusive territory north of the Hellgate - Musselshell river - to the mouth of the Milk river and up to the international border. In 1873-1874, the southern boundary of the Blackfeet country was moved northward over 300 kilometres (200 miles) by two Presidential Executive Orders. The Blackfeet, together with the Gros Ventre and River Crow, were now placed upon a reservation comprising all of Montana east of the Rockies and with Birch creek - Marias river - Missouri river as the southern boundary. The founding of the town of Gold Butte in 1885 was a prophetic trespass on Indian land (Meloy 1986). As well, pressure was put on Congress by the cattle industry to get the Reserve thrown open. On May 1, 1888, Congress ratified an agreement with the Gros Ventre, Piegan, Blackfeet and River Crow, whereby those tribes ceded (or were deprived of) 7 million hectares (17¼ million acres) of their large joint reservation and agreed to make their homes on three smaller reservations within the area. This cession was still in the 1950's referred to by the older Piegan as the time "when we sold the Sweet Grass Hills." They considered the Sweetgrass Hills the most prominent landmark in that portion of the ceded area over which their bison hunting parties used to roam.

Nevertheless, the ethno-historical information available on the Sweetgrass Hills is fragmentary and incomplete. Bonnichsen and Baldwin (1978) listed warfare (e.g., the Assiniboines and Cree killed 400 Gros Ventres near the Sweetgrass Hills in 1835 (Bradley 1900), a Cree party attacked the Blackfeet in 1850 near the Sweetgrass Hills killing, among others, Eagle Calf (Pitkanistow), a famous Blackfeet warrior (Dempsey 1965), while Dawson (1875) found 16 km (10 miles) north of Centre Butte the bodies of 20 unburied Crow Indians on the scene of a conflict that occurred sometimes in 1873), hunting, plundering and horse stealing (Dempsey 1975; Dusenberry 1979) as some of the activities known to have occurred prior to 1875. There is also a record
(Bonnichsen and Baldwin 1978) of an Assiniboine Sun Dance having been held in the hills in 1878 with 300 lodges in attendance.

There is a record (Wissler 1912) of a certain medicine-pipe, known as the otter-carrying-strap, used more in war than otherwise. The owner of this medicine-pipe always took the lead when on the warpath or when trying to overtake the enemy. White-dog, an Assiniboine chief, and his party had stolen horses from the Piegan. While the Piegan war party was on White-dog's trail, the man who carried the medicine-pipe made medicine with it. As White-dog had a good start with the stolen horses, the Piegan despaired of overtaking him, but through the power of the medicine-pipe they did, and killed him near the Sweetgrass Hills.

Cooper (1957) has recorded the account of a Gros Ventre hunter who, while hunting for game in the Sweetgrass Hills, was caught by a violent storm. When lightning struck nearby, he and his fellow hunters "saw 'thunder bugs' being pulled out of the earth by thunder; the bugs wiggled up and up, until they could no longer be seen." It was claimed that, after the storm, one could see the holes in the earth from which the 'thunder bugs' had come.

Jiusto and Schwab (1992) noted that tribal history and oral traditions among the Blackfeet revealed ancient ties to the Sweetgrass Hills. Blackfeet raiding parties would look to the Sweetgrass Hills before their departure for a sign, a few puffy, billowy clouds parked over the Hills on an otherwise sunny and clear day, that their trip would be successful (O.T. Hatton, 1994; personal communication). In fact, the Blackfoot descended directly from the Hawk totem - Hawk was born in the Sweetgrass Hills which are sacred (Canada Heritage Foundation 1988). "I go to Bear Creek (flowing north from East Butte) to hear Natosi, Sun, sing the welcoming and honouring song, a special song for Siksika (Blackfoot): 'The Sweetgrass Hills will speak to you; the prairie will watch over you." (Canada Heritage Foundation 1988).

Four Bears, a Blackfoot, told Grinnell (1962; Diettirt 1992) that the smallest of the three buttes (Centre Butte) was regarded as sacred - "when I was a young man, I went up on the top of the Sweet Grass Buttes, where the Indians are afraid to go." Four Bears further stated (Diettirt 1992) "...while I slept my medicine said to me, 'Take the name Pe-nut-u-yeis-tsim-o-kam [Fisher Cap].'"><br>Schultz (1988) in an article about 'Life among the Blackfeet', written in 1883, substantiates this: "The worship of the middle butte of the Sweetgrass Hills partakes more of fear than veneration. It is said that if any one happens to camp by it, that it will appear to him in dreams and ask him for a woman, promising in payment some of the game which is so plentiful on its slopes. Camps are never pitched at its base, and any one hunting about it must make it a present." (Compare the 'Calf Shirt' and the 'A woman sacrificed to a butte' stories in Appendix 1).

Principal figures in the Blackfeet religion are the bundle holders. These are the individuals in each generation who have been selected to receive and safeguard specific sets of sacred information or sacred medicine. Among the Blackfeet there are 12 of these people. Each bundle holder does have a particular place, a geographic locality, that is important to them. Of the 12 bundle holders, four have a special relationship to the Sweetgrass Hills. They go to the area for their sacred responsibilities, their religious activities (United States Department of the Interior 1987).

Origin Myths

Several accounts exist as to the origin of the Sweetgrass Hills. Nápi made the Sweetgrass Hills from huge handfuls of herbage (Spence 1987). According to Holterman (1985), Nápi made the Sweetgrass Hills by tearing them out of Chief Mountain to show the Great Spirit how clever he was. Wissler and Duval (1909) recorded a different version of this theme: "There was once a Great Spirit who was good. He made a man and a woman. The Old Man came along. No one made Old Man; he always existed. The Great Spirit said to him, 'Old Man, have you any power?' "Yes," said Old Man, "I am very strong." "Well," said the Great Spirit, "suppose you make some mountains." So, Old Man set to work and made the Sweet-Grass Hills. To do this he took a piece of Chief Mountain. He brought Chief Mountain up to its present location, shaped it up, and named it. The other mountains were called blood colts. "Well," said the Great Spirit, "you are strong." Another story notes that while Nápi was travelling about making mountains, prairies, timber, brush and people, he built the Sweetgrass Hills from some rocks he carried with him (Grinnell 1962). Nápi made the Sweetgrass Hills where he walked; he made the Cypress Hills where he sang; and he made the Porcupine Hills where he played (Canada Heritage Foundation 1988).

Bonnichsen and Baldwin (1978) related a Blood story indicating that originally a range of mountains ran from the west to the east as far as the Little Rockies; however, Nápi had a gambling bout with a mountain Indian and lost all the mountains but the Sweetgrass Hills, Bear Paw and Wolf Mountains. These stand yet in their old place, while the rest of the mountains were moved and placed among the Rockies.
Other Myths

We-sa-ka-cha'k (Ahenakew 1973), Wesuketchuk (Brass 1978), Wisaketchak (Mandelbaum 1979), Wesakchak (Bennister 1979), or We-Shask-Ka-Chask (Anonymous) is one of the prime culture heroes of Cree folklore (Mandelbaum 1979) who possessed supernatural powers (Brass 1978). He appears in a number of ancient legends that have their setting in and around the Sweetgrass Hills. It is believed that he remade the world under the Creator's supervision. It is said that We-sa-ka-cha'k created the Sweetgrass Hills by leaving imprints of his buttocks where he slid into the earth (Barclay 1981). In one legend he was considered to be the Father of the People (Anonymous) -

_We-Shask-Ka-Chask was an Indian giant with long white hair and a snowy beard. He was thin and wiry and, though aging, had bright, piercing eyes. He had set up his lodge at the very top of Middle Butte in the Sweetgrass Hills, so he could see all over the prairies where the bison ate the short grass and grew fat. He was here before the bison. So strong was his medicine that he drank from the morning dew, and the Great Spirit supplied him with food. His name meant he was indomitable or invincible, and he so believed, for he thought himself the Father of all the People on the earth._

This was Blackfeet country, too, and the Blackfeet believed the Great Spirit had created the Sweetgrass Hills as a place to look for bison and used them just for that. But before there were Blackfeet, We-Shask-Ka-Chask already walked the earth, from ocean to ocean, crossed the mountains and the plains and returned to the three Buttes on the prairie.

He knew that he was Father of all the People, but he knew another person, called Round Man, who was as short and fat and weak of legs as We-Shask-Ka-Chask was tall and straight and lean and strong of limb. Round Man thought he was Father of the People, too, and this angered We-Shask-Ka-Chask, who sought for Round Man to contest the title, but Round Man was not to be found.

Round Man, who lived somewhere to the south, finally came to see We-Shask-Ka-Chask, and with the help of many of his people, Round Man climbed to the top of the Butte where the Cree leader lived. We-Shask-Ka-Chask sneered at Round Man and reviled him for trying to claim to be Father of all the People.

Round Man took his scolding in silence, then said he had come to prove to We-Shask-Ka-Chask that he, Round Man, had come to this land before the wild animals, before the bison, that he had known huge animals on the plains, some of them many times the height of a man.

This infuriated We-Shask-Ka-Chask, and he retorted that he had been on these plains when fogs and mists covered the earth and big reptiles wandered over the earth. They argued and argued, and finally Round Man tired of the argument.

Then We-Shask-Ka-Chask suggested each would lie on his couch until death came to one of those who claimed to be Father of all People. This suited Round Man, who was sure his fat body would outlast that of the thin, emaciated We-Shask-Ka-Chask.

So the two lay on their couches atop the Middle Butte overlooking the bison plains. After 50 years Round Man raised himself on his elbow and peeked at We-Shask-Ka-Chask; but the old Cree still breathed strongly, so Round Man lay down again upon his couch.

Another 50 years passed, and the summers and winters came and went, and the bison grew fat and were killed at the pishkun, and Round Man again raised himself from the couch and prepared to leave the lodge. But We-Shask-Ka-Chask called in a small, thin voice to come back, for he was still alive.

Sorrow and disappointment crossed the face of Round Man, then his fat body collapsed into a pile of grey dust on the floor of the lodge. We-Shask-Ka-Chask had proved himself to be the Father of all the People.

Wesuketchuk was a friend to animals and nature as well. He spoke to them and addressed them all as his little brothers. He played many tricks on them and so they were wary when he approached, but he nearly always outwitted them. Brass (1978) collected
a number of Wesuketchuk stories such as to why the crows are black, why the fox will always be hunted by man for its pelt, why trees have lumpy trunks, why rabbits have narrow shoulders, why frogs are shy and timid, how to foretell whether winter will be cold or a mild one, and how Wesuketchuk lost his fear of bears.

**Anthropogenic Stone Structures**

The Sweetgrass Hills have played a major role in and still are part of the cosmos of the Native Americans as witnessed by oral (Jiusto and Schwab 1992) and literature accounts (Bennett 1980; Horse Capture 1980; Bullchild 1985). In fact, they have always been considered sacred. Evidence for this can be found on peaks and ridge lines of well-weathered stone features, such as cairns, oval or horseshoe-shaped structures, talus depressions, alignments and eagle trapping pits. Trees and shrubbery which have grown up in the middle of some of the structures suggest considerable antiquity (Dormaar and Reeves 1990; Jiusto and Schwab 1992).

Tinkman (1855) gave one of the earliest recorded descriptions of structures on the Sweetgrass Hills. He also noted that the Blackfeet thought that the Káto-yí-sis or “Sweet Pine Hills” had been created by Providence for them to ascend and to use as lookouts. Many of these stone structures relate to the Vision Quest (Bennett 1980; Horse Capture 1980; Bullchild 1985). About 300 talus depressions towards the southeast end of the West Butte are thought to be “War Lodge Pits” (J.H.Brumley, 1983; personal communication).

A fort-like structure can be found on the runout of the south facing rock slide of Centre Butte. It has an elliptical axis of about 4 m (13 ft) and is about 2 m (7 ft) across. It also has an opening allowing one to walk into the structure. The rocks of the structure are completely weathered and blend right in with the surrounding weathered rock slide. A Robert Carroll found a great pile of mountain sheep horns nearby in 1898 (E. Gasser, 1994; personal communication). This allows the speculation that this structure served as an animal blind. It is interesting to note that an artist (Karl Bodmer), who accompanied the party headed by German naturalist Maximilian Alexander Philipp, Prinz von Wied-Neuwied while retracing in 1833 part of the trail of Lewis and Clark (1805), recorded a pyramid of elk antlers, 4.9 to 5.5 m (16 to 18 feet) high and 3.7 to 4.6 m (12 to 15 feet) in diameter, erected by the Indians as a charm to bring success in hunting (Snyder 1970).

Various other, for now unexplained, stone structures can be found throughout the Hills. The caption of a photograph (p.207) in 'The Hills of Home’ (Milk River District Historical Society 1975) reads in part: "On the top of West Butte there is said to be a shale rock look-out house that the Indians made in 1854."

Van West (1986) has described the remains of a much different structure that may still stand in the Sweetgrass Hills. Usually located in thickly timbered high country, the war lodge of the Blackfoot Confederacy was "a most ingenious example of Indian architecture." Travelling Peigan war or hunting parties used three aspens or cottonwoods to build a permanent lodge in the shape of an "L" with willow posts latched to the foundation. They stripped the bark from the trees and placed them, along with twigs and branches, on the foundation's exterior. The warriors completed the war lodge by laying several aspens or cottonwoods around its base to a height of 60 cm (two feet). Large enough to sleep 12 warriors, the lodge had a long, covered entrance made of "heavily forked tree trunks" angled out for at least three metres (ten feet). The war lodge served as a scouting post, a supply base, and, in the worst of times, a fort. Kept in constant repair, a war lodge built in two hours by a dozen warriors might be used for several decades.

The Devil's Chimney cave on the East Butte is of particular cultural importance. John Harriott, a trader from Chesterfield House, went in November 1822 to explore the Sweetgrass Hills (Harriott 1860). Encountering high winds and stormy weather in the hills, the Blackfeet guides gave Harriott the following description: "...there is a hole at the top of the mountain from whence the great winds emerge. An Indian, braver than most, had once climbed to the top, crawled to the edge, and looked in the hole. There he saw a whole new world, with herds of buffalo and many Indian camps." Hence, Devil's Chimney cave may well be considered as the spiritual centre of the Sweetgrass Hills (Harriott 1860).

Chiefstick (1989) noted that Devil's Chimney Cave, a well-known site for vision quests, was intentionally unclearly described by Mandelbaum (1979, p.159): "The place chosen was often atop a high hill, although any secluded spot might be chosen. Some boys entered a bear's den..." It was believed that during the Buffalo days bears lived in this Cave. Vision questers were often able to go to this site for the Bear Spirit.

Presently, ribboned trees, associated with spiritual activity of present day Native Americans, can be found as evidence of continued use of the Sweetgrass Hills for religious purposes.
Artifacts

Recent news items (Carter 1992; Grant 1992; Shurtz 1992 a,b,c) have reported on 'masks', carved from seashell from the Gulf of Mexico, found in a cave on West Butte. A projectile point assemblage found nearby but not in direct association with the 'masks' was mainly composed of Late Plains Side-notched points. The 'masks', about 16 centimetres (6 inches), are associated with the Mississippian Culture where they emerged about 500 to 600 A.D. in the lower Mississippi Valley. This may indicate that intertribal trade was common. Based on the some hundred 'masks' already found throughout North America, it is estimated that they are around 500 years old. Most of the ones found were in graves of males of high status. The artifacts, known as gorgets, were often worn around the neck (Shurtz 1992a). Similar 'masks' have been found in southern Manitoba (Brasser 1987). The finds in the Sweetgrass Hills extend the boundary of their distribution.

Vision Quest

The vision quest is a way of responding to the mystery that must intrude upon every individual life. That is, the vision quest was a journey to the inner, spiritual landscape that showed the questor the direction to follow in the travels through the physical landscape (Jahner 1977). Hence, young American Aborigines would retreat to a special place for such a quest. It did not have to be a once in a lifetime event. Some individuals repeated the vision quest throughout their lives as a ritual of guidance and renewal. The special place would generally be where there were no other people. It could be a mountain top, near a lake, a river, the forest, a high hill, or a big rock. Chief Broken Arm, signatory to the Stevens Treaty of 1855, vision quested at the Devil's Chimney Cave as did the legendary Chief Big Bear. Big Bear received a vision instructing him to make the "Chief's Son's Hand" medicine bundle. The mountains, of course, offered the vision seekers elevation - physically and spiritually lifting them above ordinary existence (Horse Capture 1980; Powers 1982). The elevated site also helps the questor to relate to the whole landscape. There are one fictional and five non-fictional accounts in the literature of such an experience in the Sweetgrass Hills (see Appendix 1).

Not only did mountain peaks or hills, charged with 'spiritual energy', that stand out from the surrounding landscape allow individuals to seek 'medicine' power from the spirit world by fasting upon these peaks and hills, they also became focal points for individuals seeking to tap into this 'spiritual energy' (Dormaar and Reeves 1993; Klassen 1995). The landscape at Writing-On-Stone, a major rock art site, along the Milk river north of the Sweetgrass Hills is dominated by the nearby presence of these Hills. The orientation and location of much of the rock art at Writing-On-Stone suggests that the presence of the 'spiritual energy' of the Sweetgrass Hills had a significant influence on the production of this rock art (Klassen 1995).

SUMMARY

The Sweetgrass Hills are topographically prominent and of scenic value. They are unique in terms of their geology and botany. Isolated highlands have a significant role in adaptive strategies of ethnic groups. Although the ethnohistorical information on the Sweetgrass Hills is fragmentary and incomplete, it is clear, nevertheless, from the presence of stone structures and carved seashells, and the evidence of the hills playing a role in origin myths, stories and vision questing, that the Sweetgrass Hills have been part of the world view of the inhabitants on the Northern Plains over the centuries and that they were a place of major religious and cultural significance. Reverence for the Sweetgrass Hills, as an area of Sacred importance, continues to the modern day. Hence, a submission (Juisto and Schwab 1992) to list the Sweetgrass Hills in the National Register of Historic Places, planned by the Montana State Historic Preservation Office, is justified.

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United States Department of the Interior.

United States Department of the Interior.

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Westgate, J.A.

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HEAVY RUNNER (Bennett 1980; although the book is true to Blackfoot cultural tradition, this particular vision account, however, is a product of the imagination of the author)

Heavy Runner, a Blackfeet Chief, after four days of solitary fasting and praying, high on the mountain top of the Sweetgrass Hills, heard a voice from the spirit world. It spoke to him in the form of a bird:

"What did you see?" asked the Raven.

"I see Earth, our mother," I answered, "With all her sons and daughters, in all their faces."

"You have seen something," said Raven. "The ground has mercy for all. At her breast all living things, with legs or wings or fins or roots, are little children nursing."

"I see that all Earth's children are one with all who have been or will be," I answered.

"You have seen something," said Raven. "You have seen the sacred hoop. It is the circle of life. Everything is enclosed within it. Everything within it is the same."

Shadow and bird, we returned to the Sweetgrass Hills and my place of fasting. There Raven departed. I watched his dark wings, heard his powerful words. "Keep the sacred hoop," he called, "and all directions lead to home."

BULL LODGE (Horse Capture 1980)

A voice had told Bull Lodge to sleep and seek visions on seven buttes. The Sixth Vision Quest took place on Middle Butte of the Three Buttes. A small boy appeared to him and led him to his father's tipi. An old man and his wife received him. The old man said, "You have finally come, my son, and I have been expecting you. For it was destined that in the experiences you were to undergo, you would reach me when it was my turn. It is known by all of us who are interested, that you are permitted to receive powers which will make you a great man among your people. Come and sit before me, and face me."

The old woman gave Bull Lodge special knowledge about a plant with curative power to be found between the Three Buttes and the Bear Paw Mountains. Finally, the old man told Bull Lodge about his next experience, his Seventh Vision. Bull Lodge was to sleep on the westernmost butte.

For his Seventh Vision, Bull Lodge went to a butte called Porcupine, located about 1½ km (1 mile) west of Three Buttes. An old man appeared to him, saying, "My son, I am the last one to help you. I have just one thing to give you." Then Bull Lodge received a whistle. With it he would be able to restore life and cure people. Bull Lodge was now ready for the life he was to live. He was twenty-three years old when his Vision Quests on seven buttes were completed.

SCARFACE (Bulchilid 1985)

Scarface was on a quest for a vision that would take him to a meeting with Creator Sun. Once he got to the base of the easternmost of the three peaks of the Sweet Pine Mountains, Scarface made a camp. He erected a sweat hut to cleanse his body and to purify himself. Following his sweat, he went to the top of the easternmost peak of the Sweet Pine Mountains where there was a shelter, a round mound of rocks piled for this particular purpose.

Scarface thought, as he sat there on the mountain top, that never had he heard of anyone meeting Creator Sun personally in the years he had been on the Mother Earth.

Nothing happened in the first two nights of his vision quest. It was the third night that a spirit came to him. However, the spirit did not come too close, and only observed Scarface in the enclosure of his sleeping area.

The sun finally went down after a seemingly long third day. The twilight shadows fell. Darkness came. Although he sang holy songs, before he knew it, Scarface fell asleep. All of a sudden he had a rude awakening. Someone had pulled him by his ankles and threw him out of the stone mound he was sleeping in. He went back into his stone structure, lit his pipe and offered the smoke to the spirit. As the spirit took those first few puffs of the pipe, Scarface fell slowly asleep, may be a trance. The spirit bestowed his powers on Scarface. The spirit also explained the way to reach Creator Sun.

Calf Shirt (Dempsey 1994)

Calf Shirt's (Onistaresesokasin) mystic power of invincibility was given to him while he was still a young man. The Bloods were camped near the East Butte of the Sweetgrass Hills when he decided to go on a vision quest. Calf Shirt went to the top of the East Butte, and there, while fasting, a grizzly bear spirit visited him but refused to give him the supernatural power he sought.

"To receive power, you must give me a woman," the bear spirit said.

Calf Shirt returned to his camp, where he told the youngest of his four wives to dress in her finest buckskins. Then he escorted her to the summit of the Butte where he stabbed her to death and piled a cairn of stones over her body before returning to camp to mourn and bewail his loss.

That night, Calf Shirt had a dream in which the bear spirit returned to him and told him that henceforth no bullet, no arrow, or knife could penetrate his body.
A somewhat different version of this incident was recorded by Uhlenbeck (1911):

A woman sacrificed to a butte - There was a man, [that] slept on the Small Sweetgrass hills. He saw in a dream, there was a man. That was the one, which he slept on [viz. the butte]. He [the butte] said to him: I don't pity anybody. Now, if you give me a woman, I shall pity you. He said to him: Yes, I shall give you [a woman]. When he woke up, he went home. He took his youngest wife to that butte. They stood on it. Then he said: Partner, here is the woman, I give you. [He killed her.] Since that time that man became a great medicine man in war [that means: he became a great warrior with supernatural power]. He became a chief by it.

Wissler (1912) recorded a number of personal narratives recounting medicine experiences in which the Sweetgrass Hills played a role. Narrators A and D were considered to be absolutely sincere.

Narrator A-

One time I had a dream in which a medicine woman came by and gave me some paint. She said if I would use this paint I would never get the smallpox. Sometimes after this the smallpox broke out among our people. My wife was very ill but in order to get away from the smallpox, I put her on a travois and started out. Finally, the travois broke down and we stopped to camp. While we were at this place, as I lay on the ground one day looking towards Sweet Grass Hills, I saw a star coming toward me. As it came along it left a path, one side of which was yellow, and the other blue. It passed directly over my head and disappeared. As it went along it said, "I am the morningstar, I shall give you my power." Now, this is why I wear the brass button on my robe, it represents the morningstar.

Narrator D-

When I was about fifteen years old my people were camped near the Sweet Grass Hills... It would be well for me to go out somewhere and sleep and get some power... So I went down to the Sweet Grass Hills. Before I went I filled a pipe, took it to a medicine man... So he took some yellow paint, and something for the smudge, sang a song, and began to fix me up. His song was: "The man above hears me. The ground hears me. It is my medicine." Then the man took the paint, painted me, naming all the different animals as he did so. He named all that fly, all that swim, and all that walk. "Of these, one will come to you. Now when you go out to sleep you must stay with it. You must not be scared away. If you run away, you will not get power to become a great man." He rubbed the paint upon the front and the back of my head and on my breast and back, and on my shoulders. As he did so, he sang, "This man has the sun power."

Then I went up on the hills and made a shelter in which to sleep. Looking down, I could just see the camp below. As it grew dark I was frightened... and thought it would be best for me to go home. But when I thought of what the man had told me... I thought it better to stay... All night I imagined I heard people coming... I was in great fear all night. The next day I stood on my feet all day, and by night I was so tired, that I had to sleep. Now, of course, I was not afraid. I stayed there for seven days and nights and at last had a dream. In this dream I saw a raven flying toward me and heard him sing. This was in the daytime but I was asleep. Then a person appeared to me and said, "There is a hill down by the river and a man invites you." Now the raven was a messenger and told me that this man had the power of eating. He said, "He knows all about eating. No matter what happens he will never be killed. He will always get food... This man is going to help you out." When we came to the man, the raven asked him: "Do you run away, you will not get power to become a great man." He rubbed the paint upon the front and the back of my head and on my breast and back, and on my shoulders. As he did so, he sang, "If you run away, you will not get power to become a great man."

Now it was the man's turn. He wore a coyote skin for a cap and this he gave to me. He made a smudge out of sage grass. Then he sang a song, took up the paint and prayed for me. Then sang another song and made the sound of a raven. Then the raven said, "You must not jump or try to dodge bullets, for they will not hit you. But you must let no one throw a moccasin at you or hit you with it or you will lose your power."

Now it was the man's turn. He wore a coyote skin for a cap and this he gave to me. He made a smudge out of sage grass. Then he sang a song, "I want to eat a person," and made the sound of a coyote. Then he took up some white paint, rubbed it on my body, painted my nose and mouth red, and my head, breast, and back yellow. "Now," said the man, "I give you power to doctor men shot by bullets. Power to take out things sticking in the throat, as when people are choked." Now I have this power.
APPENDIX 2

The North West Mounted Police and the Sweetgrass Hills

On April 5, 1872, a Thomas Hardwick, in charge of a whiskey trading and wolfing operation in the Sweetgrass Hills with 15 other white men and 9 half-breeds, was approached by a band of friendly Assiniboines. Hardwick and his men opened fire killing four Indians. Since they were not apprehended by the Indian agent for the Upper Milk River County, A.J. Simmons, for this act, another minor battle occurred between the same factions in the Cypress Hills a year later. It were these incidents that finally sparked the organisation of the North-West Mounted Police (Dempsey 1957).

On June 6, 1874, 300 red-coated members of the North-West Mounted Police (now the Royal Canadian Mounted Police) left Toronto for western Canada to quell the disturbances among the Indians and to eliminate the whiskey trade (Fardy 1984). Their goal was Fort Whoop-Up near Lethbridge, Alberta, at the fork of the St. Mary and Belly (now Oldman) rivers. Instead, by early September, after more than 1100 kilometres (700 miles), the force reached its destination at the junction of the Bow and Belly (now Oldman) rivers only to find three dilapidated log huts. From a point on high ground, three remarkable hills that resembled gigantic beehives could be seen far off on the southern horizon - the Trois Buttes or Sweetgrass Hills (Turner 1950).

Most of the men were severely weakened and the horses and oxen were all but done in. Hence, the force turned south towards the Sweetgrass Hills on September 14. On the night of 18 to 19 September the exhausted men took refuge in a coulee close to West Butte. The site was near an old Boundary Survey camp. Here, near the 'Sandstone Rocks', they found wood, good grazing and plenty of water. Since about 40 horses died here, this coulee was dubbed Dead Horse Coulee (on recent maps it has been renamed Black Coulee). Both men and the remaining stock recuperated quickly.

Julien (1961), correspondent for the Canadian Illustrated News, observed on September 21, 1874, that the Sweetgrass Hills consisted of three elevations known to the half-breeds as "Les Trois Buttes."

"They are in a line with about four miles of intervening space, measuring from one extremity to the other about 23 miles. They are a notable landmark, being on the boundary line between Canada and the United States, the Western Butte on the line being on British, the other on American soil."

Commissioner George Arthur French, Colonel James F. Macleod and several others left for Fort Benton on September 22. In the course, more than seventy five thousand buffalo were sighted west of West Butte. While in Fort Benton, Commissioner French not only obtained supplies, but also a guide and interpreter by the name of Jerry Potts. Eventually, on the morning of October 6, 1874, Colonel Macleod rode out of the Sweetgrass country with half the force and Jerry Potts in the lead to establish a western NWMP outpost near Lethbridge.

A Richard Barrington Nevitt, Assistant Surgeon with the force, painted a brown, almost monochromatic watercolour (18 x 25 cm or 7 x 9 15/16 inches) of the West Butte in 1874. The strong contrasts of the light and dark, graduating in tone from the whiteness of the paper itself to the very deep browns, give the hills a very effective solidity (Nevitt 1974). This painting, carrying the inscription of "Sweet Grass Hills, the West Butte - Sept. 74", is presently at the Glenbow-Alberta Institute, Calgary, Alberta. Another watercolour, entitled "Curious Rocks near Sweet Grass Hills - Sept. 74" (also 18 x 25 cm or 7 x 9 15/16 inches) is presently in the Art Gallery of Hamilton, Ontario.

With the increase of settlers, the Blackfoot found new targets for their horse and cattle stealing raids. As well, their traditional victims, the Montana Gros Ventres and Assiniboines, were not forgotten. Raids back and forth across the border (Medicine Line) became common place (Fardy 1984). A string of NWMP outposts along the border was needed to watch and report on the movements of the Indians to and from the United States.

In the spring of 1887, Jerry Potts guided the police to well-known border crossings such as Writing-on-Stone and Pendant d'Oreille. Another reason for the selection of these frontier outposts was their proximity to the Sweetgrass Hills and in particular the gold mining camp north of Centre Butte established in 1884 (Turner 1950; Hurt 1979). The Writing-on-Stone post would be in the right spot to curtail some of the rowdiness of the prospectors which would inevitably overflow the international boundary. That is, the Sweetgrass Hills and the Medicine Line were the historic reasons for the police post's existence (Barton 1991).

On occasion, such as in 1890 and 1895, fires originated in the Sweetgrass Hills. The fire of 1895 swept down from the hills on May 17 and burned over a township on the south side of the Milk river north of the border before it was extinguished by the men
of Writing-on-Stone (Campbell 1959). The fire was supposed to have been started by sheepmen in the hills, so as to drive cattle away from their neighbourhood.

In 1894, three half-breeds had begun a reign of terror in and around the Sweetgrass Hills. A Corporal Dickson resolved to bring them in. Upon reaching their camp at dawn he hid their horses. While two were out searching for their animals, Corporal Dickson captured and handcuffed the third, then fired several shots. The others responded to the signal, only to find themselves looking down the barrel of the policeman's pistol. Although the arrests were made north of one of the boundary cairns, a new survey revealed that the cairn was out of line by about 600 metres (2,000 feet) too far south and thus on American soil. Hence, the prisoners had to be released (Berry 1953; Barton 1991).

Campbell (1959) quoted from the sessional report of 1895 in which Superintendent R.B. Deane related the following story -

"On the 16th August (1895) we lost a four-horse team which apparently strayed away from the herd at Writing-on-Stone during a day when the prairie was covered with dense smoke from a bush fire in the mountains, and we scoured the whole country with a radius of many miles before we eventually found them. There is a mining settlement in the Middle Butte and Constable Richardson was sent to inquire of the settlers there if the horses had been seen or heard of. He arrived at the mining camp at 3 p.m. on the 24th August; the men had been drinking heavily and were just dispersing after a general row. Richardson was talking to one of the miners when a man named Long, known as the "Terror of the Buttes", ran up and wanted to fight. He struck Richardson, who returned the blow and got his assailant down, saying to the bystanders as he held him on the ground, 'I don't want to pound this man.' They shouted 'Let him up!' and he did so. Long then picked up two big stones and with one hit Richardson a severe blow on the arm. To avoid further trouble Richardson left and went to a Mr. Barnes' ranch about five miles off where he was invited to stay for the night. At about 9 p.m. Long rode up to the ranch and seeing Richardson said, 'Do you want to fight now you dirty s-o-b?' 'No,' replied Richardson. 'I don't want to have anything to do with you,' and he turned to walk away. Long pulled out a revolver and saying, 'Take that you s-o-b,' fired deliberately at him, hitting him in the hip. Long said to Barnes, 'I hope I have hit him in a good spot, if not I'll come back and finish him in the morning,' and rode off. The settler drove Richardson to his detachment at Writing-on-Stone next morning and from there he was driven the 90 miles to Lethbridge where the bullet was extracted and where he soon recovered from the effects of the wound."
Charles Marion Russell had many friendships in Montana cow country, but perhaps the most intimate was with Con Price, a man five years his junior. Their acquaintance began in 1889 and ripened into a friendship that lasted almost 40 years.

"By 1899, Price had settled on a squatter's claim on Kicking Horse Creek southwest of the West Butte, Sweetgrass Hills of Montana. The ranch, in addition to the basic claim of 146 ha (360 acres), included 1215 ha (3000 acres) of government land under fence. With limited capital, Price struggled hard to eke out a living, since he needed money to stock the ranch. On one of Russell's visits to the ranch, Price told him of his problems.

In typical Russell fashion, Charlie told Price to figure out what the spread was worth, including the livestock, and he would invest an amount equal to half the estimated total. With that, a partnership was formed between the two cowboys. Price was able to build a herd of about 300 cattle, and he acquired about 60 horses. The Russells filed on land adjoining the Price ranch, and the firm of Price-Russell was established January 1, 1906.

The cattle brand of the partnership was the Lazy KY and the two horse brands were the 3, and the reverse E and T. The latter, one of the oldest brands in Montana, was transferred to the partnership by Montana Governor Joseph Toole as a mark of esteem for Price and Russell. The cowboy artist's favourite horse at the ranch was Sandy, a gift from Price.

In 1911, Price sold the Lazy KY ranch."
John Maate, Chester, County Agent, office 2nd flr courthouse

Trip to Whitlash? 73 mi.

Turn a @ old bank; turn b @ c't home

Arr. 9:30

Renee Rasmussen,
Chester hi school source

Rocks but it's hand difficult (?) (i.e., ignores)

Plains (strip farming) on way to Hills

My kids a distant barn wall

Grain elevators pepper c'to. plains every so often

Calista ferry cemetery (cuple dogeran graves, since 1903?)

butler (hill) sat in 3 o'clock magic it, subtle, complex, Y complex

Pic: o. of E. Butler (7 mi. on of Chester)

Water sit's ignored drain - pond mining

Gold of emerald, green of which, base of pyramid (Vein from Butch?)

Pic: Scoundrel
Sweetgrass: long, tall, slender grass; sweet-smelling
Glacial rocks in field; some "long" signs of suitcases
Sandy sward
Core samples: broken up, flat, and brown for trace
Core samples, implements found: broke rod with toolbars
Core samples; clumps shown; alt. little avalanche path cup out of opal
Pumice, gravel
Pyrite; quartz; C. Q. variety of pebbles
Silver sage
Hells brandy Buffalo, William, and guest
Hells Y.E. Buffalo from West
town
Breakdown in bottomland: aster (tansy), 5 buffalo (cloud)
Mitey's summer: cutting turned tansy (as he tons?)
Give Mitey a Kittenaque-like tan?
Abolition Rock King - Dugelman, Arndt, Regan (machine)

Grass, hills, planes; Indian paintbrush, lupine, & Om Ano's face, all in bloom
Mitch in Sweetgrass Hills:
- rocks of all sizes, up to suitcase
- Bread Creek nearby
- sage & flowers
- hills sculpted in comparison to TWS benchlands
- silence
  - except for sound of John Deere (?)
- coyote pack: scent & wind separate ("prime up" by mid-Oct)
- beaver: 1st Nov water animal season
- long-haired animals: 1 Dec, water/mud rap - hi entry for predator: skunks, weasels, coyotes
- pre-bug: lynx, otter, marten
- undergrounder: fox

14 days more camp

Winter "pretty lumpy"
bit "can/can't 30 days" otters/minks expected
10 "dear friend of knowledge"
ecosystem mangm- what we have to lay, not take

Long - froma Kelly '75
trapper Nelson - 2a meat / clutch early home for pike/fish
to Bud & Janet Moore:

south on highway 83 from Wh'fish/Flathead Lake area, watch for milepost 42; turn r. on Glacier Creek Road (between log community hall & store); go for one mile, take the road's right fork; go another mile, take another right; one more mile to their place; will see a sawmill first

phone #(406)754-2473
"Rough Tomatoes"    "smarting it up"
"got to be all fired together"

Camp trails: shelf for sleeping bag.
4 season tent - $5.50

Salty: came curing to hell
- bolder
- growing to water needed for horses

Bob: upthrusts
- tand on e. slope; less underbrush; sage-type in valley bottoms
(2/3 point of Martin dump on mojave; more moisture/probably by Sloan hole
- elk crying
(traplines on L, in Calii., etc.)

"splendid" traplines up to six min from tent camps
"Down into camped gear" hiking: need energy! (taste dry corn)
- need sugar but you "burn out too soon" w/o fat
- N. Cooking didn't need all of sugar as flour! (black tea w/o sugar)
- loved apricots, buy dry, care
- "if you're really putting it in" (on trail)
Girl's episode: trapped in bitter cold, maybe 50 lbs
- hanging valley climber: was "putting out a lot"
- we mom: shell a work shirt, after taking off wool cumber
- cold, kept moaning, cd.) take big mantes he caught
- woodwork, welder for place to build fire; spotted a stump hollow
  to bore; carries portepee pine pitch a day or pitch, cut it in
  blocks, split it into mantel size rings; cold flew in top of mantel
- match case - finely sawed trap's planing; got fire going, smoke went
  straight up in cold; went to off mantel & sat on chest, sat up
- regenerating in an hour went on w/ flight plane
  (5-6 resin shavings will ignite at/away)
  (match case in pocket X impale in case glare of one falls)
"spirit of place": resource of wilderness
- power places: small spots where you just want to stop & soak it up (maybe)
- what is unique? (Locke: eden, a tree-growing capacity)
- physically feel it: 1 mo a way it is
- people in wilderness is a complete high
- stand with it map case a back of pack

hairy experiences: entering Cold Creek
- griz stamped horses over ranger
- Bud mtns. graz: that heard a dog b Ark - came up & told him -
  not, chopped his teeth, halfed (Bud chanting "what a nice
- 3d time stayed standing
  (snaps X touches simultaneously)
- backpacked out more on luna & been here
trapped; cowl hooded roughly to his camp. Got lost in blizz trying to find camp in dark—owl hooded him from mishap.

"Flead wall" of Meisson Mtns

- kidney infection/hypothermia

Bad: I'mi jackstay fence is a perennial job (by time you get it re-ann'l, time to start over.)
available records as of November 1, 2009. The County does not assume liability for errors in ownership. Anyone desiring to obtain ownership records may do so at the Liberty County Courthouse.

Monty Conservation District

Price $6.00
Spikelets with 1 terminal perfect floret and 2 staminate florets, disarticulating above the glumes, the staminate florets falling attached to the fertile one; glumes equal, 3-nerved, broad, thin and papery, smooth, acute; staminate lemmas about as long as the glumes, boat-shaped, hispidulous, hairy along the margin; fertile lemma somewhat indurate, about as long as the others, smooth or nearly so, awnless; palea 3-nerved, rounded on the back. Perennial, erect, slender, sweet-smelling grasses, with small panicles of broad, bronze-colored spikelets. Type species, *Hierochloë antarctica* (Labill.) R. Br. Name from Greek *hieros*, sacred, and *chloe*, grass, holy grass; *H. odorata* was used in parts of Europe for “strewing before the doors of churches on festival days.”

Flowering culms with short blades only (rarely to 10 cm. long) with few to many long-leaved sterile shoots at base.

Staminate lemmas bearing exserted awns.

1. *Hierochloë alpina* (Swartz) Roem. and Schult. (Fig. 793.) Culms 10 to 40 cm. tall, tufted, with leafy shoots at base and short rhizomes; blades 1 to 2 mm. wide, the basal ones elongate, those of the culm shorter and wider; panicle contracted, 3 to 4 cm. long; spikelets short-pedicled, 6 to 8 mm. long; staminate lemmas ciliate on the margin, awned below the tip, the awn of the second lemma 5 to 8 mm. long, bent, twisted below, that of the first a little shorter, straight; fertile lemma acute, appressed-pubescent toward apex. 2

Arctic regions, Greenland to Alaska, south to Newfoundland and Quebec; alpine meadows and rocky slopes, high mountains, Maine, New Hampshire, Vermont, New York, and Montana; Europe.

2. *Hierochloë odorata* (L.) Beauv. Sweetgrass. (Fig. 794.) Culms 30 to 60 cm. tall, with few to several leafy shoots and slender, creeping rhizomes; blades 2 to 5 mm. wide, sometimes wider, those of the sterile shoots elongate, those of the culm mostly less than 5 cm. long, rarely to 10 cm. long; panicle pyramidal, 4 to 12 cm. long, from somewhat compact to loose with slender drooping branches; spikelets mostly short-pedicled, 5 mm. long; staminate lemmas awnless or nearly so, fertile lemma pubescent toward the apex. 2

Meadows, bogs, and moist places, Labrador to Alaska, south to New Jersey, Indiana, Iowa, Oregon, and in the mountains to New Mexico and Arizona; Eurasia. The Indians use the grass, known as Seneca grass, to make fragrant baskets. Also called holy grass and vanilla grass. A tall form with culm blades 12 to 17 cm. long, and a very loose lax panicle,
Hierochloe odorata.

Culms 60 to 90 cm. tall, with long leaves and creeping rhizomes; sheaths scabrous; blades flat, rather stiffly upright, 25 to 50 cm. long, 8 to 15 mm. wide, narrowed to the base, acuminate, scabrous beneath; panicle mostly open, 7 to 15 cm. long, the subcapillary branches drooping, loosely flowered or the spikelets aggregate toward the ends, the lower branches 2.5 to 7 cm. long; spikelets 4 to 5 mm. long, the glumes with a pale shining margin; staminate lemmas awnless or nearly so; fertile lemma appressed-pubescent toward apex. 2 (H. macrophylla Thurb.)—Forests in the redwood belt, Oregon to Monterey, Calif.; Bingen, Wash.

117. ANTHOXANTHUM L. VERNALGRASS

Spikelets with 1 terminal perfect floret and 2 sterile lemmas, the rachilla disarticulating above the glumes, the sterile lemmas falling attached to the fertile floret; glumes unequal, acute or mucronate; sterile lemmas shorter than the glumes, empty, avened from the back; fertile lemma shorter than the sterile ones, awnless; palea 1-nerved, rounded on the back, enclosed in the lemma. Sweet-smelling annuals or perennials, with flat blades and spike-like panicles.

Type species, Anthoxanthum odoratum. Name from Greek anthos, flower, and zanthos, yellow, alluding to the yellow inflorescence.

Plants perennial

1. Anthoxanthum odoratum

Plants annual

1. A. odoratum

2. A. aristatum

1. Anthoxanthum odoratum L.

SWEET VERNALGRASS. (Fig. 796, A.)

Culms tufted, erect, slender, 30 to 60 cm. tall, rarely to 1 m. tall; blades 2 to 5 mm. wide; panicle long-exserted, brownish yellow, acute, 2 to 6 cm. long; spikelets 8 to 10 mm. long; glumes scabrous, the first about half as long as the second; sterile lemmas subequal, appressed-pilose with golden hairs, the first short-awned below the apex, the second awned from near the base, the awn twisted below, geniculate, slightly exceeding the second glume; fertile lemma about 2 mm. long, brown, smooth and shining. 2 —Meadows, pastures, and waste places, Greenland and Newfoundland to Louisiana and Michigan, and on the Pacific coast from British Columbia to California; introduced from Eurasia. Sometimes included in meadow mixtures to give fragrance to the hay, but the grass has little forage value.

2. Anthoxanthum aristatum Boiss.

(Fig. 796, B.) Differing from A. odoratum in being annual, the culms lower, often geniculate and bushy branching; panicles looser; spikelets a little smaller. 2 —Waste places in several localities from Maine to Iowa; West Virginia; North Carolina; Florida; Mississippi and Arkansas; Vancouver Island to California; introduced from Europe.

EHRHARTA Thunb.

Spikelets laterally compressed with 1 fertile floret and 2 large sterile lemmas below enclosing the fertile floret; rachilla disarticulating about the glumes, the fertile floret and sterile lemmas falling together; glumes ovate, rather obscurely keeled; sterile lemmas indurate, compressed, 3- to 5-nerved; fertile lemma indurate, ovate, 5-nerved, obtuse. Erect or decumbent spreading annuals or perennials with flat blades and narrow panicles. Type species, Ehrharta capensis Thunb. Named for Friedrich Ehrhart.

Ehrharta erecta Lam. Culms erect or ascending from a decumbent base, branching, mostly 30 to 50 cm. tall; blades 5 to 12 cm. long, 4 to 9 mm. wide; panicles 6 to 15 cm. long; sterile lemmas awnless, the first smooth, the second cross-wrinkled. 2 —Escaped, Berkeley, Calif. Introduced from South Africa. Shows considerable competitive ability and may become of value in re-
SEPARATION NOTICE

The following items have been removed from Box 43, Folder 5, Collection 2602, for oversize storage elsewhere.

Items Removed:

35 mm Slides: # 357 - 456 were removed from Series 2 - Books & Other Writings, Subseries 8 - Mountain Time (1999). Transparencies were relocated to Series 8 - Photographs, Subseries 1 - 35mm Slides.

X Material has been placed in Box 154, Folder 41, Collection 2602

____ Location information is available from the Special Collections Staff.