北海道における初期農耕関連資料

——サクシュコトニ川遺跡出土の植物種子——

Sakushu-Kotoni River Site :
The Ezo-Haji Component Plant Remains

北海道大学文学部

サクシュコトニ川遺跡出土の植物種子について

遺跡名　サクシュコトニ川遺跡
所在地　北海道札幌市北区北17条西13丁目（北海道大学札幌団地内）
北緯43°04′　東経141°20′
発掘期間　1981年8月14日～1982年9月24日
発掘面積　5,904㎡
調査機関　北海道大学埋蔵文化財調査室

サクシュコトニ川遺跡においては，上層より無遺物の間層をはさんで3枚の遺物包含層が確認された．最上層の第1文化層からは，擦文時代（エゾ土師期後期あるいは擦文期のもの），第2文化層からは竪穴住居5軒と多数の焼土および多量の炭化物質を含む遺物廃棄スポット（エゾ土師期後期，西暦9世紀代）が見出されている。これらについては『サクシュコトニ川遺跡：北海道大学構内で発掘された西暦9世紀代の原初的農耕集落ⅠおよびⅡ　1986　北海道大学』に詳しい．その調査結果のなかでも，この遺跡の第2文化層から検出された植物種子については，量的にみても質的にみても従来の考古学の常識の変更を迫るものであった．この調査結果をみれば，すくなくともオホーツク沿岸をのぞく北海道の各地には，かなりのウエイトで農耕が行なわれていたと考えざるをえない．北海道の農耕の初原的形態にせまる最初の資料という重要性にかんがみて，原報告資料の誤りを補正し若干の資料追加をおこない，この小冊子を公刊し研究の便に資することにした．

1986年7月30日

北海道大学文学部基礎文化論講座人類学研究室
吉　崎　昌　一

Sakushu-Kotoni River Site : The Ezo-Haji Component Plant Remains

Site Name: Sakushu-Kotoni-River Site
Address: 3 Banchi, Kita 17 Jo, Nishi 13 Chome Sapporo, Hokkaido, JAPAN
Longitude and Latitude: 43° 04′N 141° 20′E
Research Organization: Hokkaido University Salvage Archaeology Laboratory
Excavation Dates: August 14, 1981 to September 24, 1982
Excavation Area: 5,904㎡

Three horizons (components) are recognized at Sakushu-Kotoni River. The upper two are Satsumon or Ezo- Haji. The plant remains are from the middle horizon (A. D. 800 — 850).

サクシュコトニ川遺跡出土の植物遺存体

はじめに

本論は，サクシュコトニ川遺跡出土の植物遺存体のうち，主にフローテーション・サンプルの分析と若干の考察からなっている．分析研究は現在も続行中であり，最終報告ではない．この遺跡でフローテーション法を採用した目的は，a)擦文時代における植物利用のパターンを復元すること，b)同期における農耕の存在を検証すること，の2点であることに農耕の存在については，おおよそ同時期と考えられる道内の3遺跡から炭化栽培植物が検出されていること，また農耕具も他の遺跡から検出されたことなどを考えあわせる

と非常に重要な問題である（石附　1975；岡田・山田　1982）．さいわいに今回の調査で得られたフローテーション・サンプルの分析により，農耕の存在は確証を得たといえよう．

サンプル

本論では種子と果実についてのみ触れる．同定できた種は Table 1 にまとめてある．炭化物のうち調査済みのものは約197ｇ，未調査のものは約200～210ｇである．調査済みの遺物の中には116,422個の種子が含まれていた．これより推察すると，この遺跡よりえられたすべてのサンプル中には約234,000個の種子が含まれ，そのほとんどが栽培植物のものである．なおこれらのサンプルは２号，３号住居の焼土，および住居外の「炭化物マウンド」から得られた．

同定

ここで報告する32種類の植物のうち10種類は栽培植物である．それに加え，同定はできたが，分類しえなかったもの，同定もできなかったものなどがいくつかある．

非栽培植物は，１年生の雑草(非栽培植物のうち46％)，多肉果実(47％)，他に４種類の植物群からなる，タデ属(*Polygonum*)の中ではレンズ状の種子をもつ*P. densiflorum* (Pl.1)が最も優勢である．オオイタドリ(*P. sachalinense*) に類似したものもみられた．イネ科雑草のうち穀果のものは，イヌビエ(*Echinochloa crusgalli*) (Pl.1d) を除き，「未同定」の数の中に含まれている．「未同定」のイネ科雑草は，キビの仲間に含まれるものと，Crawford(1983：37)であげた「Type 2」のイネ科雑草の２つに大きく分けられる．イヌビエの種子は平均1.5㎜×1.1㎜であるが，縄文前期末から中期末にかけて種子の大きさが15％増大することが，亀田半島の遺跡で確認されている．イヌビエの表現型が多様であることはよく知られている．例えば亜種のタイヌビエ(*E.crusgalli* Beauv. var. *olyzicola*)は水田雑草としてよくみられるものである(Barret 1983)．しかし，サクシュコトニ川遺跡でイネが検出されたとはいえ，ここでみられるイヌビエが水田雑草であることや，イネが栽培されていたという明確な証拠はない．この他にギシギシ属(*Rumex,* 種はスイバ〈*R.acetosa*〉(Pl.1a)，ギシギシ〈*R.japonicus*〉，もしくはエゾノギシギシ〈*R. obtusifolius*〉)とアカザ属(*Chenopodium*，おそらくシロザ〈*C.album*〉もしくは，コアカザ〈*C.ficifolium*〉と思われる)が検出された(Crawford 1983：discussion参照)．これらの植物は主に種子と葉を食用としていたと考えられる．

非栽培植物の中で多肉果実の占める割合が47％であることはすでに述べた．しかし，多肉果実は一般に種子まで食され炭化種子となる蓋然性は低く，これらは数字以上に重要な食糧資源であったと考えられる．

現在までに道内の遺跡から５種類の多肉果実が検出されている．そのうち，イヌホオズキ(*Solanum nigrum*)，ホオズキ属(*Physalis*) (Pl.1b)，ガンコウラン属(*Empetrum*) (Pl.1e)の３種類は，今回の検出例が最初である．これらはいずれも食用となる(Heiser 1969；Ohwi1965 ：788)．また，最初の２種は荒れ地や農耕で攪乱された土地でよくみかけるものである．

多肉果実の遺存体については，すでに Crawford(1983)の中で触れているが，この種類の植物は食用以外にも利用されている．例えばミズキ属(*Cornus*)，ブドウ属(*Vitis*)は食用の他，イナウなど宗教的器具の材料となる．

「その他」の中には４種類のものが含まれている．そのうちネギ属(*Allium*)は，住居外の「炭化物マウンド」からかなり多量の検出があった．ただし炭化種子ではなく，炭化した球芽としてである．この種のうちノビル(*Allium grayi*)は，低地の草原でみられるものである(Ohwi 1965)．付表にあがっていない他の３種類はキハダ(*Phelodendron*)?，オニ

グルミ(*Juglans ailanthifolia*)そしてエンドウマメ様のマメ科植物である．最後のものはレンリソウ属(*Lathyrus* sp.)として道内4個所の遺跡からの出土が知られている．

数字の上では，キビ(*Panicum miliaceum*)(Pl.1g)アワ(*Setaria italica*)(Pl.1h)は優勢な栽培植物である．この他にキビもしくはアワである可能性を持つグループがあるが，これは「未同定」としている．又，キビと同定されたグループの中には，ヒエの可能性の有る種子もある．しかし，ヒエとキビとの区別は微妙なものであるため現段階において確定はむずかしい．道内の先史遺跡からのヒエの出土例は報告されていないが，西南日本の歴史時代の遺跡からは3例が知られている．

Fig.1と2にキビとアワの種子の大きさの変異を示しておいた．2つの測定値ともヨーロッパ種(Van Zeist 1968)として報告されたものの値の範囲におさまる．

この遺跡において，数の上では，最も優勢な栽培植物であった穀物はオオムギ(Pl.3)である．これは六条オオムギ(*hexastichous*)である．Fig.3に示した測定値は，北部ヨーロッパ種(Van Zeist 1968)の範囲におさまる．国内の他の先史遺跡出土のオオムギは比較的小型で，九州上ノ原の例（3.8×2.0㎜，小谷 1972）を除くと，サクシュコトニ遺跡出土例のもつ変異の範囲におさまる．

この遺跡出土のコムギ(Pl.2f)はあまり例のないもので，その測定値はコンパクトコムギ(*Triticum aestivum ssp. compactum*)の変異の範囲の外側に位置する．この種は，小型種のインディアンワーフコムギ(*T.aestivum ssp. sphaerococcum*)となんらかの関係があることも考えられる．測定値は小型種のコムギとパンコムギの値の間に位置している(Fig.4参照・Janushevich 1984：275，276；Van Zeist 1968：126，128)．またこれらはエンマコムギ(*T.dicoccum*)ともいくつかの類似点がみられる．

イネは6個体検出され(Pl.3)，いずれも短粒型の*japonicum*である．測定可能であった跡出土の値は4.1×2.6㎜(L／W＝1.6)であった．なお佐藤(1971)では，100以上の弥生遺1個体のイネを分析し，L／W＝1.3～2.0，短粒型であるとしている．

マメ科植物ではアズキ(*Vigna angularis* var. *angularis*)，ケツルアズキ(*V.radiatus* var. *radiatus*)を検出した(Pl.2b,c)．

ウリ(*Cucumis melo*)は破損したもの1個体を検出した(Pl.a2)．藤下(1984：64)は日本各地出土の5,076個体のウリが集成しているが，本例に適合するものは含まれていない．この他にシソ(*Perilla frutescens* var. *crisp*)(Pl.2e)，アサ(*Cannabis sativum*)(Pl.2d)を検出した．ともに食用の他に油採集などに利用されたであろう．

考察

まだ分析していない試料の中に，かなりの量のムギの小穂の柄の一部が含まれている．このことは農耕の存在と矛盾しない．さらに，筆者はこれら栽培植物が食生活の中で重要な位置を占めていたと考えている．

これら栽培植物の多くは日本列島の先史遺跡からの出土としては最北の例である．また，アワ，イネ，ウリ，コムギは道内最初の例である．イネ，ウリはごく少量のため，ここで栽培されたものである確証はない．しかし，筆者は，小規模であるが，ここでの栽培を想定している．

最後にサクシュコトニ川遺跡の植物遺存体の構成は，カナダ・オンタリオ州のWoodland(Iroquoian)における構成に類似している点を指摘しておきたい．両者とも，各々の地域で最北の食糧生産地帯であること，狩猟採集を主な生業としていること，同様の技術体系をもっていることなど共通点を多くもっている．その中で植物の構成が類似していること(Crawford 1985，Monckton 1985)を考察することは，エミシ・エゾ社会あるいは擦文時代における初期農耕をめぐる議論の一助となろう．

SAKUSHU-KOTONI-RIVER PLANT REMAINS

Gary W. Crawford *

Introduction

This report details the analysis and initial interpretations of the flotation samples from Sakushu-Kotoni-River. The data reported herein were identified and quantified in December of 1984 with some analysis continuing until the time of this writing. The purposes for collecting the plant remains were a) to describe plant use patterns in the Ezo-Haji phase (Yoshizaki & Okada 1984) and b) to test for the existence of plant husbandry. The latter test was important because of previous discoveries of a few carbonized cultigen remains as well as agricultural tools from sites on Hokkaido dating to roughly the same time period as Sakushu-Kotoni (Ishizuki 1975; Okada and Yamada 1982). In this first analysis of flotation samples from the ninth century in Hokkaido, the plant husbandry hypothesis has been confirmed. The quantities, taxonomy, and metric data regarding the cultigens, along with a discussion of wild and weedy taxa and their implications to understanding Ezo-Haji subsistence are outlined.

The Samples

Some 150 soil samples were flotated by the excavation staff utilizing a form of the bucket method outlined in Crawford (1983). The light fractions were decanted into fine gauze rather than geological sieves. The gauze succeeded in collecting a large quantity of millet ranging from about 0.8 mm in minimum width, as well as smaller weed seeds. The carbonized seeds** were separated from their light fraction matrix over a two year period. This analysis pertains to the resulting seed and fruit portion only. Contents of small samples were examined in their entirety. Larger samples were not entirely separated because of extreme time constraints; 30–50% of these samples were carefully examined and the contents of the remaining portion estimated on the basis of the examined components. Identifications and quantifications are summarized in Table 1 and 2.

Nearly 197 g. of carbonized material have been analyzed to date. Approximately 200 to 210 g. of sorted remains have not yet been examined. The unexamined samples number 65, averaging 3.0 to 3.2 g. per sample. In the material examined so far are 116,422 seeds. Assuming that the unexamined light fractions have a similar composition, the total sample from Sakushu-Kotoni is expected to contain approximately 234,000 items, mostly cultigen seeds. The samples are from Houses 2 and 3, external house pits, areas of burned soil (e.g. unit 22-16) and refuse dumps outside houses (e.g. units 17-10 through 18-10).

Identifications

Thirty-two plant taxa comprise the collection reported here. Ten of these are cultigens. An additional 16 taxa are identifiable (64 seeds) but not yet classified (unknown). Some unidentifiable specimens are present. Table 1 summarizes the taxa that occur in the samples. Items are listed in the same order that they appear in Table 2.

The non-cultigens (1679 items) consist of weedy annuals (46% of non-cultigens), fleshy fruits (47%), and four other taxa (7%) (Plate 1). Several species of *Polygonum* (11) are present, but the lenticular *P. densiflorum* is the most common. Nineteen achenes are likely *P. sachalinense* while eight specimens are unidentified, trigonous achenes. Caryopses of wild grasses in the sample belong

to a number of yet unidentified taxa except for the 109 specimens of *Echinochloa* (12) (Plate 1d). The unidentified grass seeds are mainly two types. One appears to be in the Paniceae tribe, with flat, rugulate caryopses measuring 1.2 by 0.9 mm. The second type is similar to the Type 2 grass illustrated in Crawford (1983:37). The *Echinochloa* seeds measure, on average, 1.5 by 1.1 mm. *Echinochloa* has been identified in Jomon samples from the Kameda Peninsula where the seeds increase in size by about 15% over a period spanning the end of the Early Jomon to the end of the Middle Jomon (1000 to 1500 year span) (Crawford 1983). The grass is genetically flexible and phenotypically variable. For example, *E. crus-galli* var. *oryzicola* Ohwi is a rice mimic in paddy fields. It is a large seeded form (Barrett 1983). Although rice is present at Sakushu-Kotoni, there is no evidence that the *Echinochloa* here is a large seeded rice mimic, nor does it appear to be a cultigen.

Two other herbaceous weeds, *Rumex* (14) (Plate 1a) and *Chenopodium* (15) are present. Both are present in archaeological collections from the Kameda Peninsula (Crawford 1983). The latter taxa cannot be identified to species at the moment, but the first is likely either *R. acetosa, R. japonicus* or *R. obtusifolius* and the latter is probably *C. album* or *C. ficifolium*. The possible identifications are based on the size range of the specimens (see Crawford 1983 for discussion). Plants in this herbaceous weedy annual group can be used for their seeds and greens except for the grasses which could be used as a grain source.

Fleshy fruit seeds are an important component of the Sakushu-Kotoni assemblage. Although they represent 47% of the non-cultigen seeds, their importance here is probably underestimated by the percentage figure. The weedy annuals are prolific seed producers in comparison with fleshy fruit producing plants. Fleshy fruits are usually ingested seeds and all, so again, the probability of fleshy fruit seeds being carbonized is lowered. The weedy annuals probably represent fortuitous weed seed inclusions in the cultigen harvest and to some extent represent a source of leafy vegetable food. The fleshy fruit group is more likely a food source.

Five of the fleshy fruit taxa have been previously reported from archaeological sites in Hokkaido. Three, *Solanum nigrum* (16), *Physalis* (17) (Plate 1b), and *Empetrum* (18) (Plate 1e), are reported here for the first time from archaeological contexts in Hokkaido. The first two are herbaceous weeds, common in waste ground and areas disturbed by cultivation. *Solanum nigrum* berries (16) are toxic when green, but present no problem once ripe. The young leaves of this plant are edible as well (Heiser 1969). *Physalis alkekengi* (17) is a weedy, perennial herb producing an edible berry within a bladdery calyx (Ohwi 1965:788). This is the only Asian species in northern Japan today. It is also found throughout Korea and northeastern China (ibid). It is often cultivated today, and it is a possible cultigen at Sakushu-Kotoni. *Empetrum nigrum* is an evergreen shrub that is common in Hokkaido and grows in dense mats (Ohwi 1965). It grows along the Japan sea coast today, and not in the immediate Sapporo area. Whether or not its distribution was different in the ninth century is unknown.

The remaining fleshy fruit taxa are all discussed in Crawford (1983). Of all the taxa in this group, *Sambucus* is the most common in the site vicinity today. *Cornus* and *Vitis*, besides providing edible berries, are reportedly important sources of raw materials for making items such as *inau* and other sacred symbols (Sarashina and Sarashina 1976).

Within the "Other" category are four taxa, one of which, *Allium* (27), is in significant abundance in five samples from the large midden east of House 2. The remains of *Allium* are not seeds; they are carbonized sessile bulbils which form in place of flowers on some members of this genus. Ohwi (1965) lists only one species, *Allium grayi (nobiru)*, in Japan with this characteristic. *Nobiru* is found in lowland meadows, and would have probably been available close to the

Table 1　Plant Taxa Identified in the Sakushu-Kotoni-River Flotation Samples

Cultigens		
1. *Hordeum vulgare*	barley	*o-mugi*
2. *Triticum* c.f. T. *aestivum*	wheat	*ko-mugi*
3. *Panicum miliaceum*	proso or broomcorn millet	*kibi, inakibi*
4. *Setaria italica*	foxtail millet	*awa*
5. *Oryza sativa* var *japonicum*	rice	*kome*
6. *Vigna angularis* var *angularis*	adzuki	*azuki*
7. *V. radiatus* var *radiatus*	mung bean	*ketsuru-azuki*
8. *Cucumis melo*	melon	*uri, makuwa-uri*
9. *Perilla frutescens* var *crispa*	beefsteak plant	*shiso*
10. *Cannabis sativum*	hemp	*asa*
Weedy Grains/Greens		
11. *Polygonum* sp.	knotweed	*tade zoku*
P. densiflorum		*inu-tade*
P. sachalinense		*o-itadori*
12. *Echinochloa crusgalli*	barnyard grass	*inubie, ta-inubie*
13. Gramineae	grass family	*ine ka*
14. *Rumex* sp.	dock	*gishi-gishi zoku*
15. *Chenopodium* sp.	chenopod, goosefoot	*akaza zoku*
Fleshy Fruits		
16. *Solanum nigrum*	black nightshade	*inu-hozuki*
17. *Physalis* sp. c.f. *P. alkekengi*	Chinese lantern plant	*hozuki*
18. *Empetrum nigrum*	crowberry	*gankouran*
19. *Rubus* sp.	bramble	*ki-ichigo zoku*
20. *Vitis* sp.	grape	*budo zoku*
21. *Actinidia* sp.	silvervine	*matatabi, kokuwa*
22. *Sambucus* sp. c.f. *S. seiboldiana*	elderberry	*ezo-niwatoko*
23. *Cornus* sp.	dogwood	*mizu-ki zoku*
24. *Phellodendron amurense*	Amur corktree	kihada
Others		
25. *Rhus* sp.	sumac	*urushi zoku*
26. *Ostrya japonica*	ironwood	*asada*
27. *Potamogeton*	pondweed	*hiru-mushiro zoku*
28. *Allium* c.f. *A. grayi*	onion	*negi zoku;* c.f. *nobiru*
29. *Juglans ailanthifolia*	walnut	*onigurumi*
30. *Lathyrus* sp.	wild pea	renri-zoku

hamlet. Collection of *nobiru* may not always have taken the Ainu outside the hamlet. Sarashina and Sarashina (1976:160) mention that *nobiru* could be harvested from the back yards of Ainu houses. No mention is made of whether or not the plant was encouraged to grow there or in gardens. Nevertheless, both Sarashina and Sarashina (Ibid.) and Ohnuki-Tierney (1974) report that *nobiru* (presumably *nobiru* in the case of Ohnuki-Tierney who refers to "leeks") was minced and added to a variety of foods. Large quantities of *Allium* were stored and dried; harvesting took place in July to mid-August (Ohnuki-Tierney 1974:29).

Three other taxa are in the samples, but they are not listed in the Tables. The first is a single possible *Phelodendron amurense* (*kihada*, Amur corktree) seed in a sample from 18–11[00]. Fragments of *Juglans ailanthifolia* (*onigurumi*, walnut) are in the same sample as well as from 18–10[03] for a total of 0.69g. Finally, three pea-like legume seeds are present in the same midden. Their seed coats are missing, and their diameters are 2.4, 2.7 and 3.0 mm. The genus appears to be *Lathyrus* sp. (*renri-so zoku*, wild pea), with four possible species in Hokkaido (Plate 1c). The specimens bear close resemblance to *Lathyrus maritimus* (L.) Bigel (*L. japonicus* willd.) (beach pea, *hama-endo*), a species common along beaches in Hokkaido today.

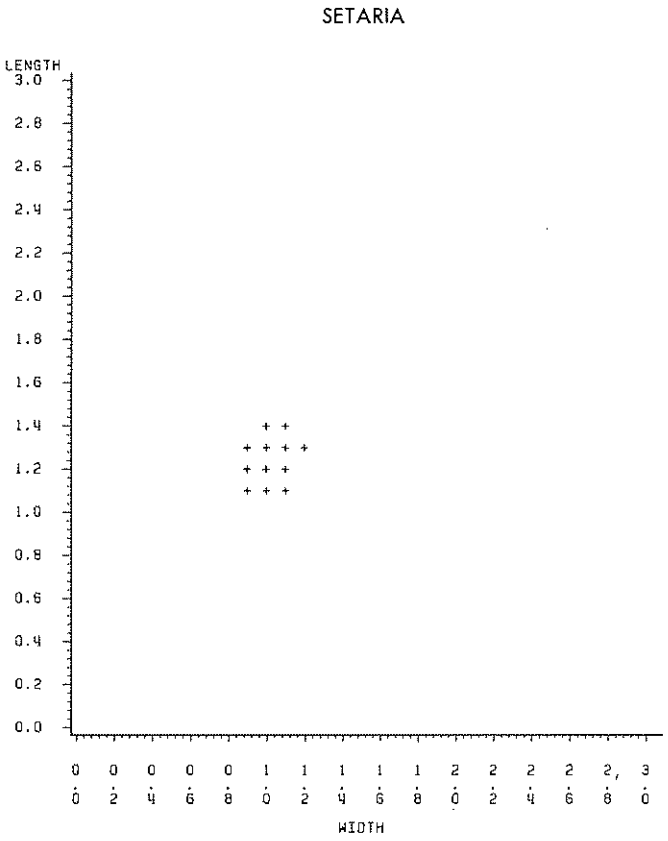
Broomcorn millet (3) and foxtail millet (4), are numerically the dominant cultigens in the samples (Plate 2). Few specimens are not hulled. They are found in nearly all contexts. A third group of large, panicoid grass seeds are difficult to further classify but seem to be either broomcorn or foxtail millet; these seeds are the "unidentifiable" millet in Table 2. Another type, barnyard millet (*Echinochloa utilis* or *hie*) may be present in the samples, but its presence has not been confirmed. The distinction between barnyard and broomcorn millet is subtle, but for the present, none is clearly identifiable as barnyard millet. This millet has not yet been found from any prehistoric Hokkaido site, although it is known from three historic sites in southwestern Japan (Matsutani 1984).

Figures 1 and 2 illustrate the size distribution of the two millet taxa. The sample of measured broomcorn millet numbers 108 while a sample of 105 foxtail millet seeds was measured. The length vs. width plot of foxtail millet shows few points due to considerable overlap of measurements. Both sets of measurements fall within the range of variation reported for European specimens (Van Zeist 1968).

Next to the millets, the numerically most common cultigen at Sakushu-Kotoni is *barley* (Plate 3). The barley is hexastichous, with both hulled and naked grains apparent. Length-width measurements are summarized in Figure 3 The measurements fall within the range reported by Van Zeist (1968) for northern European specimens. Although Asian barleys are relatively unique, in particular by being small seeded (Takahashi 1964), the barley in this sample is not small (Figure 3). Other prehistoric barley grains from Japan are relatively small, but except for the single measured grain from Uenoharu, Kyushu (3.8 by 2.0 mm) (Kotani 1972), they are within the Sakushu-Kotoni range.

The Sakushu-Kotoni *wheat* is unique (Plates 2f and 3). The sample of 106 measured caryopses has mean length and width measurements outside the range of the small club wheat, *Triticum aestivum* ssp. *compactum*, which differs from bread wheat by one gene (Van Zeist 1978: 53). The maximum width of the caryopses is toward the embryo end of the caryopses, making them somewhat drop shaped in contrast to the club and bread wheats. Indian dwarf wheat (*T. aestivum* ssp. *sphaerococcum*) is another compact form that may have some historical and taxonomic relationship to the Ezo wheat, but this has not been closely examined at the time of writing. The mean length/width ratio (Figure 4) is between that reported for some compact

Figure 1. Carbonized Foxtail Millet *(Awa)*: Plot of Length vs. Width (mm) and Length/Width. n = 105, Mean L/W = 1.2, Mean L × W = 1.2 × 1.0 mm.



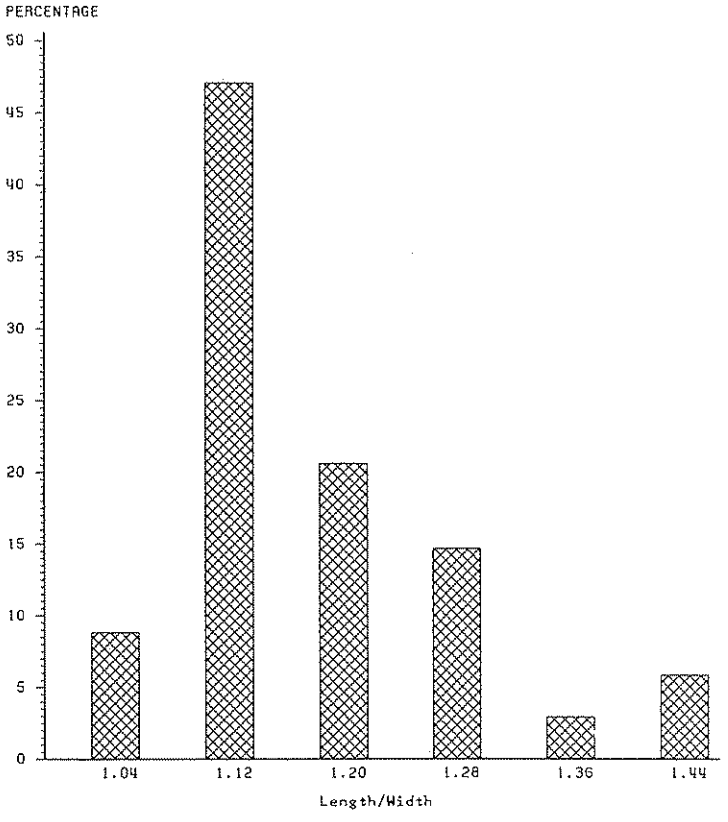


Figure 2. Carbonized Broomcorn Millet *(Kibi)*: Plot of Length vs. Width (mm) and Length/Width. n = 105, Mean L/W = 1.0, Mean L×W = 1.8×1.8 mm.

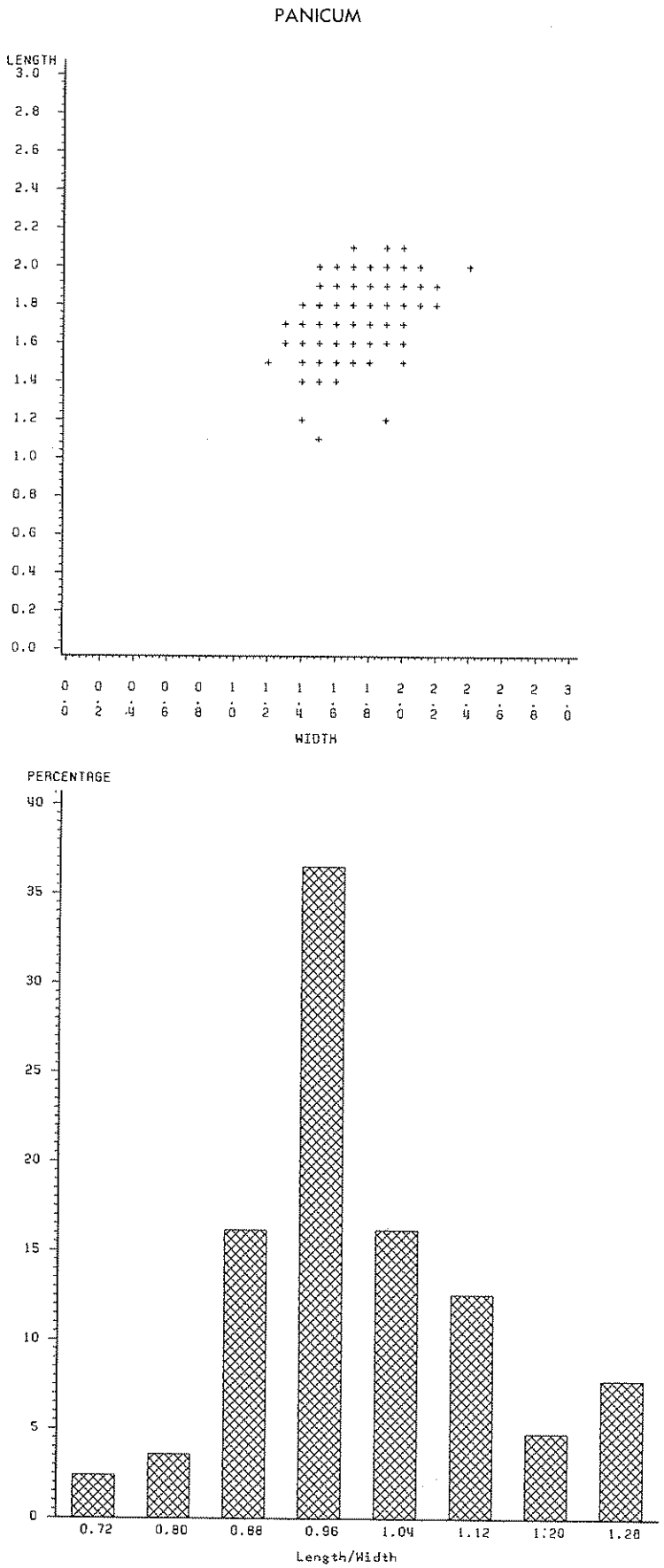


Figure 3. Carbonized Barley: Plot of Length vs. Width (mm) and Chart of Length/Width. n = 63, Mean L/W = 2.2, Mean L × W = 5.9× 2.7 mm.

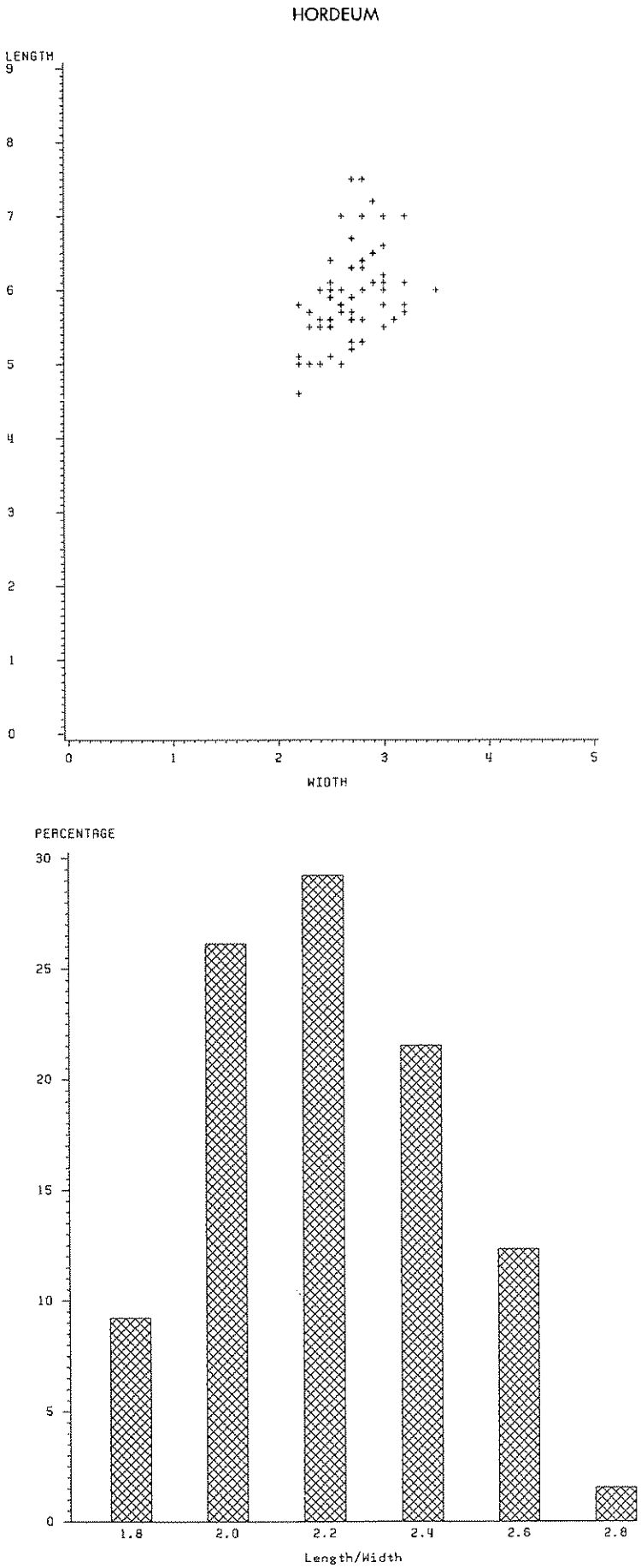
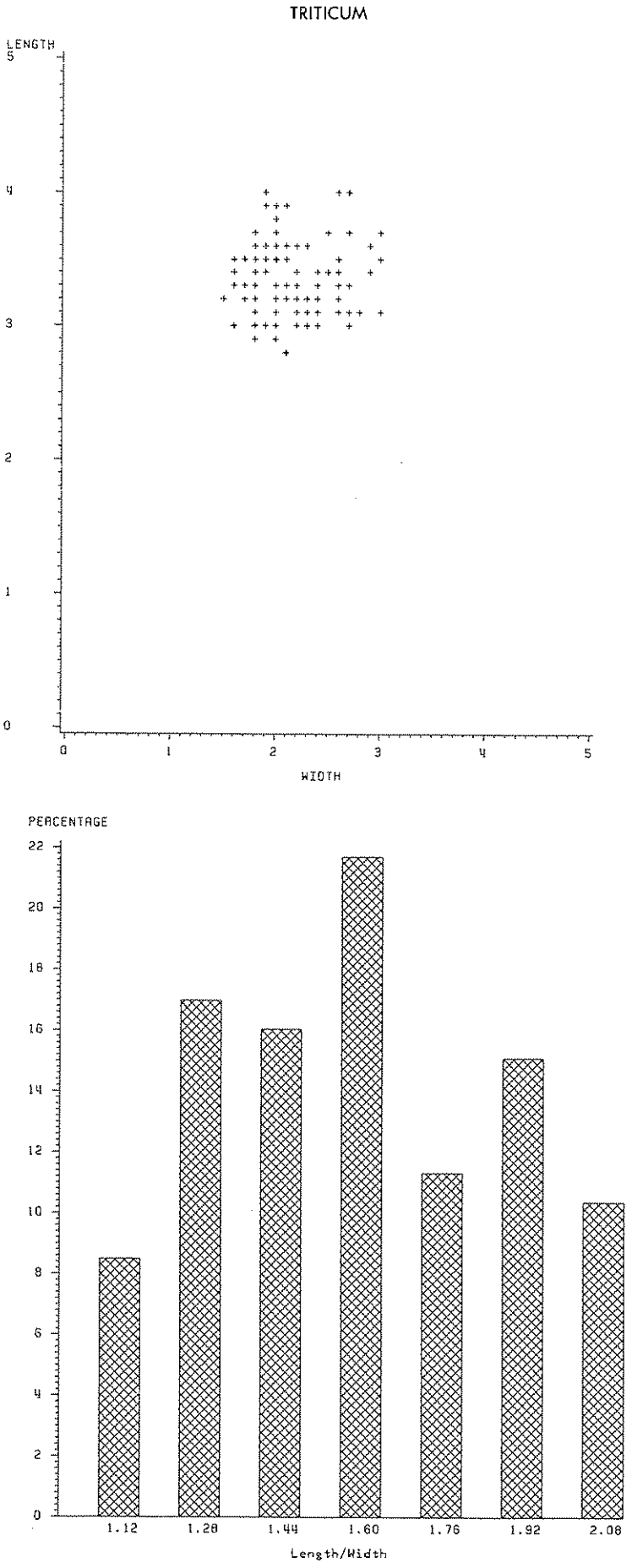


Figure 4. Carbonized Wheat: Plot of Length vs. Width (mm) and Chart of Length/Width.
n = 106, Mean L/W =1.5, Mean L×W = 3.4×2.2mm.



forms and regular bread wheat (e.g. Janushevich 1984:275, 276; Van Zeist 1968:126, 128). In a way, the Sakushu-Kotoni wheat is similar to emmer *(T. dicoccum),* which occasionally has carbonized seeds which are drop shaped. These caryopses are wider at the end opposite the embryo. Emmer caryopses are larger than the Sakushu-Kotoni specimens as well, and are not nearly so plump (L/W ratios of emmer are larger than 1.6 for the most part).

The half-dozen *rice* caryopses from Sakushu-Kotoni are all the short-grained variety, *japonicum* (Plate 3). One measurable seed is 4.1 by 2.6 mm. (length/width = 1.6). Sato (1971) classifies rice caryopses from over 100 Yayoi sites with length/width ratios between 1.3 and 2.0 as short-grained as well. All prehistoric rice so far recovered in Japan is *Oryza sativa* ssp. *japonicum.*

Within the 61 specimens of the legume, *Vigna,* two types are present. These are adzuki (6) and mung (7). No attempt has been made to separate the whole sample of beans into the two taxa; however, examples of each have been examined. Mung appears to be rare in the assemblage. A sample of 13 beans were measured and have mean (range) dimensions in millimeters of 6 (4.8 — 8.0), 4.1 (3.0 —5.7) and 3.8 (2.3 — 5.0).

One broken melon (8) seed (Plate 2a) has been identified. It is not measurable, but compares well with reference specimens of cultigen melon seeds. Not including this specimen, 5076 archaeological melon seeds from 102 sites have been reported in Japan (Fujishita 1984:64). 69% are from sites later than the Yayoi period (later than A.D. 300).

A few specimens of beefsteak plant (9) (Plate 2e) are in the Sakushu-Kotoni collection. The plant was likely used as an herb and for its oil producing seeds. This is a red-leaved form of the plant. A green leaved form *(P. frutescens* var *japonica:egoma)* has seeds which are generally distinguishable from *shiso* seeds.

Another relatively abundant cultigen seed is that of hemp (10) (Plate 2d), a plant indigenous to central Asia (Bailey 1976:218; Simmonds 1976:203). This plant has several uses: as an oil, food, fibre and drug source. Hemp grown in the north is usually used for oil, food, and fibre. The Ainu used hemp in weaving clothing and making baskets.

Discussion

This report has dealt with an initial presentation of the Sakushu-Kotoni-River plant remains. A number of technical and interpretive aspects of the remains have not been attempted at this stage. For example, Dennell (1972) and Hillman (1984) have documented techniques for determining crop processing methods using among other factors, grain size variation as a clue to sieving procedures. Metric data have been presented here to describe intra-specific variation; a full documentation of such variation by sample will be required eventually.

One important aspect of this ongoing research is that at Sakushu-Kotoni we have incontrovertable evidence for an ancestral Ainu food production phase. This phase was suspected from a few sporadic discoveries of plant remains throughout Hokkaido, but confirmation did not exist until the research on this collection. References to the early evidence can be found in English in Aikens and Higuchi (1982:307) and Crawford (1983:25). Two discussions in Japanese are by Ishizuki (1975) and Okada and Yamada (1982). To briefly summarize the interpretive status of the few cultigen reports until 1982, either the cultigens were considered sporadic imports because the few reports until then were coastal, or there was, indeed, an early agricultural phase in Hokkaido. The nearly quarter of a million carbonized seeds from Sakushu-Kotoni from excellent context, demonstrate that the latter was the case. Rice paddies and dry fields are common in the area (Ishikari Plain) today. The Plain receives an average annual precipitation of 1200 mm. Between

May and September are 2600 cumulative mean temperature degrees (Hokkaido Development Bureau 1983). Rice, for example, today requires more than 2500. The local environment is quite suitable for agriculture today.

This interpretation raises several questions. When did this plant husbandry begin and how did it develop? What became of it? What role does plant husbandry play in understanding Ainu history? Regarding the last question, the Ainu were considered to be foragers until 1884. In that year, the Japanese government instituted a programme to encourage the Ainu to take up agriculture (Watanabe 1967:72). Agriculture seems not to have been entirely new to the Ainu. Apparently, some Ainu in the Tokapchi and Azuma Valleys had done some small scale farming (Watanabe 1972:41). According to Watanabe, households grew foxtail millet *(awa)* and barnyard millet *(hie)* in plots of 1000–2000 m^2 on river banks. Hayashi (1975), too, has examined ethnohistoric data and has interviewed Ainu elders concerning this problem. The Ainu, according to Hayashi's data grew *awa, hie,* barley, wheat, *azuki,* pea, *daizu* (soy bean), *daikon* (radish), hemp, *negi* (leek or onion, *nobiru?*), cucumber, tobacco, a potato and two types of American squashes. Rice was known to the Ainu but was apparently imported. Naked barley was the most important of the *mugi* group which is also comprised of wheat *(komugi)* and hulled barley. Wheat was grown, but was not an important crop. All of these plants but *hie* (barnyard millet), according to Ainu myth, were introductions (Ibid.). Two legumes, *Vicia* and *Crotolaria* were reportedly harvested from gardens as well. This plant husbandry likely has a longer history in Hokkaido than previously suspected, a history needing considerable research.

Ten taxa of cultigen seeds appear in varying quantities in the samples. Another cultigen remain which has not been analyzed yet is the considerable quantity of barley and/or wheat rachis fragments. Including these fragments, the assemblage of carbonized plant remains are consistent with an interpretation that the Sakushu-Kotoni residents were involved in plant husbandry. Cultigen plants must have been an important part of their diet. No sickles, hoes or plough shares have been identified at the site yet, but the former are reported from three Ezo sites while the latter have been found at two Ezo sites (Okada and Yamada 1982).

Most of the cultigens at Sakushu-Kotoni are at their northernmost occurrences in prehistoric Japan. Foxtail millet, rice, melon and wheat are reported for the first time in prehistoric Hokkaido. Of these plants, rice and melon are so rare as to suggest they were not grown locally. I suspect, however, that they were grown at Sakushu-Kotoni but were not an important part of the plant husbandry system.

There are two cultigens conspicuous in their absence from the sample: buckwheat *(Fagopyrum esculentum* or *soba)* and safflower *(Carthamus tinctorius* or *benibana).* A single carbonized buckwheat seed was recovered from the late Early Jomon Hamanasuno site in southwestern Hokkaido in 1974 (Crawford, Hurley and Yoshizaki 1976; Crawford 1983). Since then, pollen analysis from archaeological contexts suggests the presence of buckwheat in northern Japan by the Final Jomon (Yamada 1980) and buckwheat pollen is known from several Zoku Jomon and Ezo period sites on Hokkaido (Yamada 1975, 1978, 1979; Okada and Yamada 1982:28). The presence or absence of buckwheat husbandry in prehistoric Japan remains a problem. To compound the issue, preservation characteristics may influence buckwheat seed recovery. In the Netherlands, the earliest carbonized buckwheat (a single seed) comes from Dommelin (Van Vilsteren 1984:230). In later periods, the prehistoric buckwheat seeds are never carbonized and come from cesspits. Carbonized seeds do not occur at the same sites (Ibid.). Carbonized buckwheat reported from the Ezo site of Toyotomi (Kohno 1959) have now been identified as safflower (Crawford 1985; Crawford and

Table 2.　Sakushu-Kotoni-River Flotation Samples: Seed Taxa as Percentage Total Number of Seeds per Sample

		Cultigens										Weedy Grains/Greens				
Grid	Pit	Hordeum	Triticum	Unidentifiable Millet	Panicum (Kibi)	Setaria (awa)	Oryza	Vigna	Cucumis	Perilla	Cannabis	Polygonum	Echinochloa	Gramineae	Rumex	Chenopodium
4-7	-	-	-	50.0	50.0	-	-	-	-	-	-	-	-	-	-	-
4-8	-	-	-	-	-	-	-	-	-	-	-	-	50.0	-	-	-
5-7	-	-	-	-	-	6.3	-	-	-	-	-	-	-	-	-	5.3
5-9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6-10	-	-	-	-	15.0	10.0	-	-	-	-	5.0	-	65.0	-	-	5.0
7-8	-	-	-	-	-	12.5	-	-	-	-	-	12.5	-	-	-	-
7-8/9	-	-	-	-	-	15.0	-	-	-	-	-	35.0	-	-	-	-
7-9[33]	4	-	-	-	-	90.5	-	-	-	-	-	2.0	4.7	-	-	-
8-7	-	-	-	2.9	5.9	11.8	-	-	-	2.9	-	5.9	-	-	-	-
8-7	6	9.1	27.3	"	9.1	36.4	-	-	-	-	-	9.1	-	-	-	-
8-8	-	-	-	-	25.0	12.5	-	-	-	-	-	-	-	12.5	-	-
8-9[02]	4	12.1	2.4	-	37.1	43.5	-	-	-	-	-	-	-	-	-	-
8-9[03]	-	21.2	8.7	-	26.2	42.7	-	-	-	-	-	0.1	0.1	-	-	-
8-8	6	-	-	-	-	91.7	-	-	-	-	-	-	-	-	-	-
8-10	-	-	-	-	25.0	50.0	-	-	-	-	-	-	-	-	-	-
9-10	-	-	-	-	33.3	33.3	-	-	-	-	-	-	-	-	-	-
9-13	-	-	-	-	59.1	36.4	-	2.3	-	-	-	-	-	-	-	-
15-16	-	-	-	-	21.7	78.3	-	-	-	-	-	-	-	-	-	-
16-11	-	-	-	-	50.0	50.0	-	-	-	-	-	-	-	-	-	-
16-19	-	-	-	-	17.9	25.0	-	-	-	-	-	14.3	-	-	-	-
16-22	-	-	9.1	-	-	27.3	-	-	-	-	-	-	-	-	-	-
17-10[23]	-	63.5	11.8	-	19.1	1.9	-	-	-	-	0.3	-	-	-	-	-
17-11[02]	-	*	*	*	23.6	75.8	-	*	-	*	*	0.4	-	-	*	-
17-11[12]	-	0.1	-	*	17.7	81.3	*	*	-	*	*	0.4	-	0.1	*	-
17-11[21]	-	3.8	2.1	-	43.1	49.2	-	0.5	-	-	-	0.1	0.1	-	-	-
17-11[22]	-	2.5	0.3	-	38.8	51.4	-	*	-	-	-	2.4	0.5	0.2	2.3	-
17-11[23]	-	7.9	2.6	-	-	-	-	-	-	-	10.5	-	78.9	-	-	-
17-11[30]	-	22.5	10.7	14.0	44.2	7.8	*	*	*	-	0.5	*	*	-	-	-
17-11[31]	-	29.7	11.2	0.1	21.6	35.1	-	-	-	*	-	0.1	0.1	0.5	-	*
17-11[32]	-	4.3	1.1	-	59.8	33.7	-	-	-	-	-	0.1	0.2	*	-	-
17-12[11]	-	7.1	21.4	-	21.4	-	7.1	-	-	-	-	-	-	-	-	-
17-12[20]	-	0.5	1.3	-	66.8	26.6	-	0.3	-	-	-	1.8	-	-	-	-
17-16	-	-	-	-	42.9	14.3	-	-	-	-	-	28.6	-	-	-	-
18-9	-	-	-	-	23.1	42.3	-	-	-	-	-	34.6	-	-	-	-
18-10	-	0.9	1.7	7.8	36.2	27.6	-	-	-	-	-	-	-	-	0.9	1.7
18-10[03]	-	11.6	1.2	-	18.4	65.1	-	-	-	-	*	*	-	0.3	-	-
18-11[00]	-	26.4	7.1	-	11.5	53.4	*	*	-	-	-	0.1	-	0.2	-	-
18-12	-	-	-	-	50.0	37.5	12.5	-	-	-	-	-	-	-	-	-
19-10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19-11	-	-	-	-	-	50.0	-	-	-	-	-	-	-	-	-	-
19-13	-	-	-	-	12.5	12.5	-	-	-	-	-	4.2	-	-	-	-
19-15	-	8.0	56.0	-	8.0	20.0	-	-	-	-	-	-	4.0	-	-	-
19-16	-	-	-	-	20.0	40.0	-	-	-	-	-	20.0	-	-	-	-
19-18	-	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-	-
20-12	-	-	-	-	30.0	70.0	-	-	-	-	-	-	-	-	-	-
20-14	-	-	-	18.2	18.2	-	-	-	-	-	-	18.2	-	-	-	-
20-18	-	-	-	-	5.6	83.3	-	-	-	-	-	-	-	-	-	-
21-12	-	-	-	-	10.0	50.0	-	-	-	-	-	30.0	-	-	-	-
21-14	-	-	-	-	5.3	57.9	-	-	-	-	-	5.3	-	-	-	-
21-15	-	-	-	-	66.7	-	-	-	-	-	-	-	-	-	-	-
22-15	-	-	-	-	-	80.0	-	-	-	-	-	-	-	-	-	-
22-16	-	-	-	-	2.0	92.0	-	-	-	-	-	-	-	-	-	-
26-15	-	-	-	-	-	66.7	-	-	-	-	-	-	-	-	-	-
26-21	-	-	-	-	20.0	80.0	-	-	-	-	-	-	-	-	-	-
28-16	-	-	-	-	29.5	65.6	-	-	-	-	-	-	-	-	-	-
27-15	-	-	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-
28-17	-	12.5	-	-	31.3	56.3	-	-	-	-	-	-	-	-	-	-
30-16	4	-	-	4.8	64.3	28.6	-	-	-	-	-	-	-	-	-	-
Total Number		11443	4108	3158	34037	61600	6	61	1	10	136	429	106	90	140	5

		Fleshy Fruits								Others							
Grid	Pit	Solanum	Physalis	Empetrum	Rubus	Vitis	Actinidia	Sambucus	Cornus	Rhus	Ostrya	Potomegaton	Allium	Unidentifiable	Unknown	Weight (g)	Total Number
4-7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	a	2
4-8	-	-	50.0	-	-	-	-	-	-	-	-	-	-	-	-	a	2
5-7	-	-	-	-	-	-	-	43.8	-	-	-	-	-	18.8	25.0	10.04	16
5-9	-	11.1	-	-	-	-	-	66.7	-	11.1	-	-	-	11.1	-	0.01	9
6-10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.02	20
7-8	-	-	-	-	-	62.5	-	-	-	-	-	-	-	12.5	-	a	8
7-8/9	-	-	25.0	-	-	-	10.0	-	-	-	-	-	-	-	15.0	0.02	20
7-9[33]	4	-	-	-	-	-	-	-	-	-	-	-	-	2.0	0.7	0.06	148
8-7	-	8.8	-	-	-	-	-	55.9	-	-	-	-	-	-	5.9	0.04	34
8-7	6	-	-	-	-	-	-	19.1	-	-	-	-	-	-	-	0.02	11
8-8	-	-	-	50.0	-	-	-	-	-	-	-	-	-	-	-	0.02	8
8-9[02]	4	-	-	1.6	-	-	-	3.2	-	-	-	-	-	-	-	0.2	124
8-9[03]	-	-	-	0.4	-	-	-	0.2	-	-	-	0.2	-	-	-	2.65	1341
8-8	6	-	-	-	-	8.3	-	-	-	-	-	-	-	-	-	0.01	12
8-10	-	-	-	-	-	-	-	12.5	-	-	-	-	-	12.5	-	a	8
9-10	-	-	-	-	-	-	-	33.3	-	-	-	-	-	-	-	a	3
9-13	-	-	-	-	-	-	-	-	2.3	-	-	-	-	-	-	0.14	44
15-16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.05	23
16-11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	a	2
16-19	-	-	-	-	-	-	-	28.6	-	-	-	-	-	14.3	-	0.06	28
16-22	-	-	-	-	-	-	-	45.5	-	-	-	-	-	18.2	-	0.02	11
17-10[23]	-	-	-	0.8	-	1.0	-	0.3	-	-	-	-	-	1.3	-	3.17	619
17-11[02]	-	-	-	-	-	-	-	-	-	-	-	-	-	*	*	35.23	41210
17-11[12]	-	0.1	0.1	-	-	-	-	-	-	-	-	-	0.1	0.1	*	4.74	6391
17-11[21]	-	-	-	-	-	0.4	-	-	-	-	*	-	-	-	0.4	12.05	7447
17-11[22]	-	0.1	0.4	-	-	0.3	0.1	*	-	*	-	-	-	0.4	0.1	6.16	5796
17-11[23]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.14	38
17-11[30]	-	-	*	-	-	*	-	-	-	-	-	*	0.2	-	-	59.22	22416
17-11[31]	-	-	0.1	0.3	*	0.1	0.1	0.1	-	-	-	-	0.5	0.3	-	9.18	3088
17-11[32]	-	0.1	*	0.1	-	0.1	-	-	-	0.1	-	-	-	0.2	0.3	5.50	3955
17-12[11]	-	-	-	-	-	42.9	-	-	-	-	-	-	-	-	-	a	14
17-12[20]	-	0.2	0.7	-	-	1.3	-	0.1	-	-	-	-	-	0.4	-	0.75	1204
17-16	-	-	14.3	-	-	-	-	-	-	-	-	-	-	-	-	0.01	7
18-9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.02	26
18-10	-	-	-	-	-	-	-	19.8	-	-	-	-	-	1.7	1.7	0.03	116
18-10[03]	-	-	2.9	-	*	-	0.2	-	-	-	-	-	*	0.1	-	14.09	10836
18-11[00]	-	*	-	0.7	-	0.1	*	-	-	-	-	-	0.2	0.2	*	37.42	10980
18-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.02	8
19-10	-	-	-	-	-	-	-	100.0	-	-	-	-	-	-	-	0.01	18
19-11	-	-	-	-	-	-	-	50.0	-	-	-	-	-	-	-	a	4
19-13	-	-	-	-	-	-	-	66.7	-	-	-	-	-	4.2	-	0.01	24
19-15	-	-	-	-	4.0	-	-	-	-	-	-	-	-	-	-	0.10	25
19-16	-	-	-	-	-	-	-	-	-	-	-	-	-	20.0	-	a	5
19-18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	a	1
20-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01	10
20-14	-	-	-	-	-	-	-	45.5	-	-	-	-	-	-	-	0.01	11
20-18	-	-	-	-	-	-	-	-	-	-	-	-	-	11.1	-	0.01	18
21-12	-	-	-	-	-	-	-	10.0	-	-	-	-	-	-	-	0.01	10
21-14	-	-	-	26.3	-	-	-	5.3	-	-	-	-	-	-	-	0.01	19
21-15	-	-	-	-	-	-	-	33.3	-	-	-	-	-	-	-	a	3
22-15	-	-	-	-	-	-	-	-	-	-	-	-	-	20.0	-	a	5
22-16	-	-	-	-	-	-	-	-	-	-	-	-	-	6.0	-	0.02	50
26-15	-	-	-	-	-	-	-	-	-	-	-	-	-	33.3	-	0.01	6
26-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	a	5
28-16	-	-	-	-	-	-	-	4.1	-	-	-	-	-	0.8	-	0.10	122
27-15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	a	3
28-17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.03	16
30-16	4	-	-	-	-	-	-	-				-	-	2.4	-	0.05	42
Total Number		19	368	110	10	104	36	136	1	5	1	7	102	129	64	19688	116422

a: less than 0.01g　*less than 0.1%

Yoshizaki, in press). These are the seeds I reported as an unknown composite (Crawford 1983 :25). Safflower is native to the Middle East (Knowles 1976:31) and is known to have been in western Japan by the eighth century (Yamazaki 1961).

The wild and weedy component of the plant assemblage likely represents fortuitous inclusions in the case of rare items and weed seeds and utilized plants in other cases. The knotweeds, grasses, dock and chenopod are useful as both grain and green, leafy vegetable food sources. Such seeds can also appear as a result of contamination during harvesting. All of the fleshy fruits but crowberry, which is not found in Sapporo or around Sakushu-Kotoni today, are likely part of the anthropogenic flora established around and in the Sakushu-Kotoni hamlet by the numerous ecologically disruptive activities of the inhabitants. Chinese lantern plant is an unconfirmed garden plant and may have become established in Hokkaido with the prehistoric introduction of cultigens.

This plant remains assemblage is somewhat similar to Late Woodland (Iroquoian) assemblages I am familiar with in Ontario, Canada. The comparison is appropriate because both Ontario and Hokkaido are northernmost occurrences of food production in their respective areas, and both Late Woodland and Ezo societies were unranked, maintained foraging as an important activity, and had similar technologies. All of the genera of fleshy fruits except for *Actinidia* and *Empetrum* are known from such Ontario sites (Crawford 1985; Monckton 1985). In addition, *Polygonum*, Gramineae, *Chenopodium*, *Rhus* and *Ostrya* are part of such assemblages. The habitats around plant husbandry oriented communities in Ontario are analogous to those from which the plant remains at Sakushu-Kotoni were derived. This further supports the contention of a local plant husbandry adaptation in Ezo period Hokkaido.

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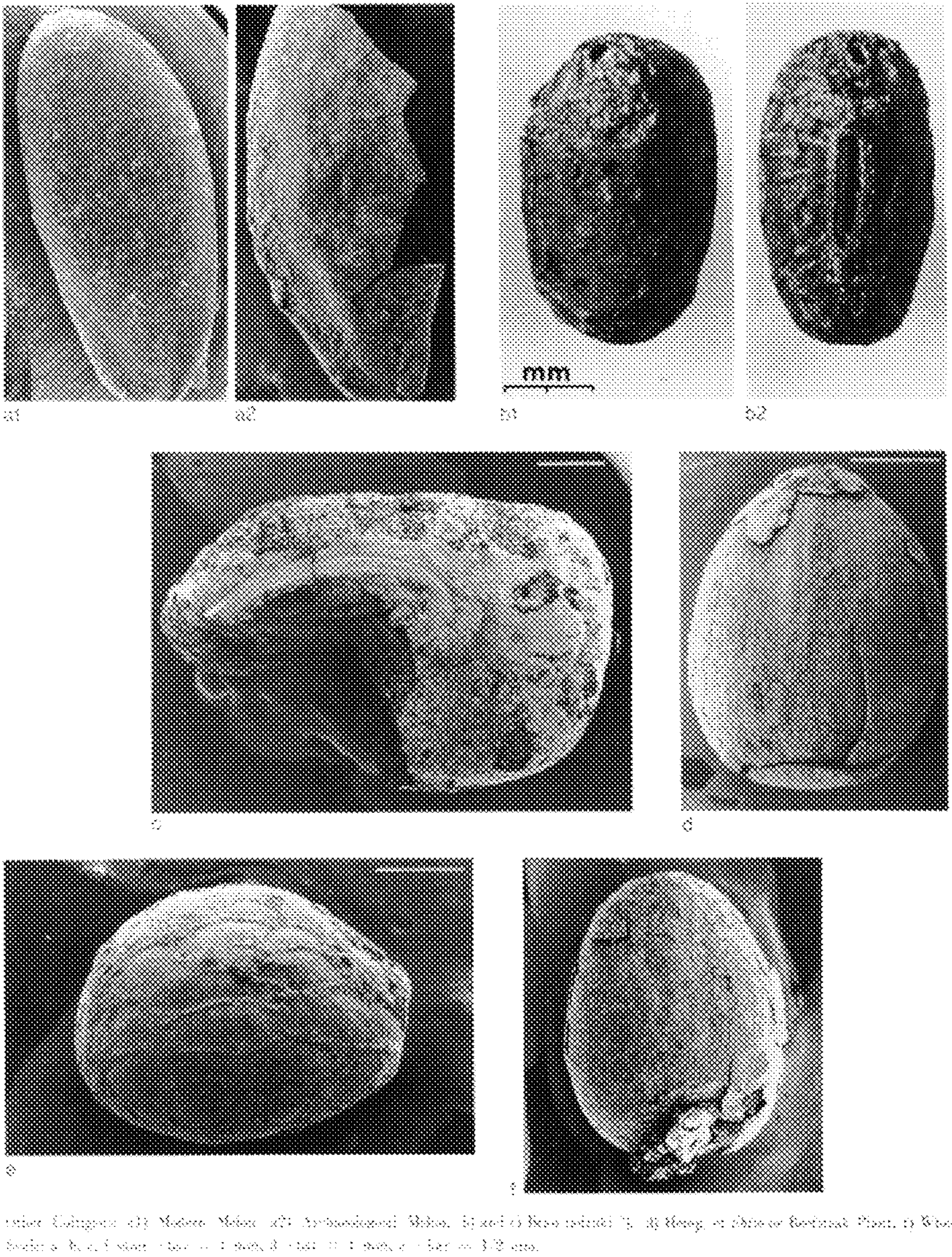
a1
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Plate 3 [illegible]

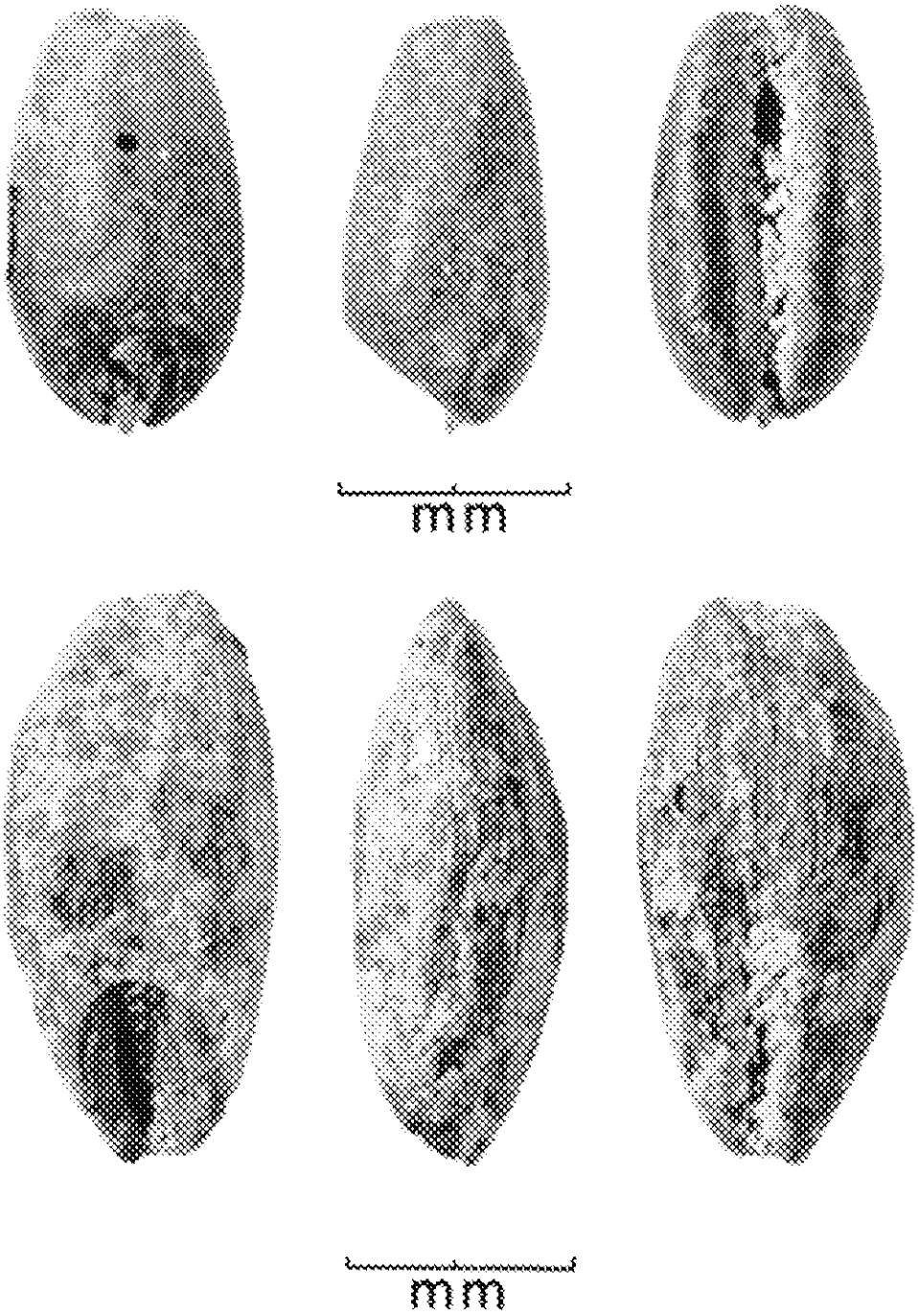
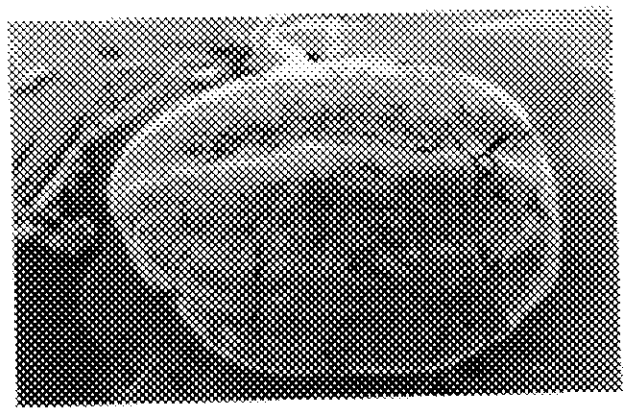


Fig. [illegible] Dorsal, Lateral and Ventral Views.

Barley : Barley Dorsal, Lateral, and Ventral Views



Rice.

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