The Midden

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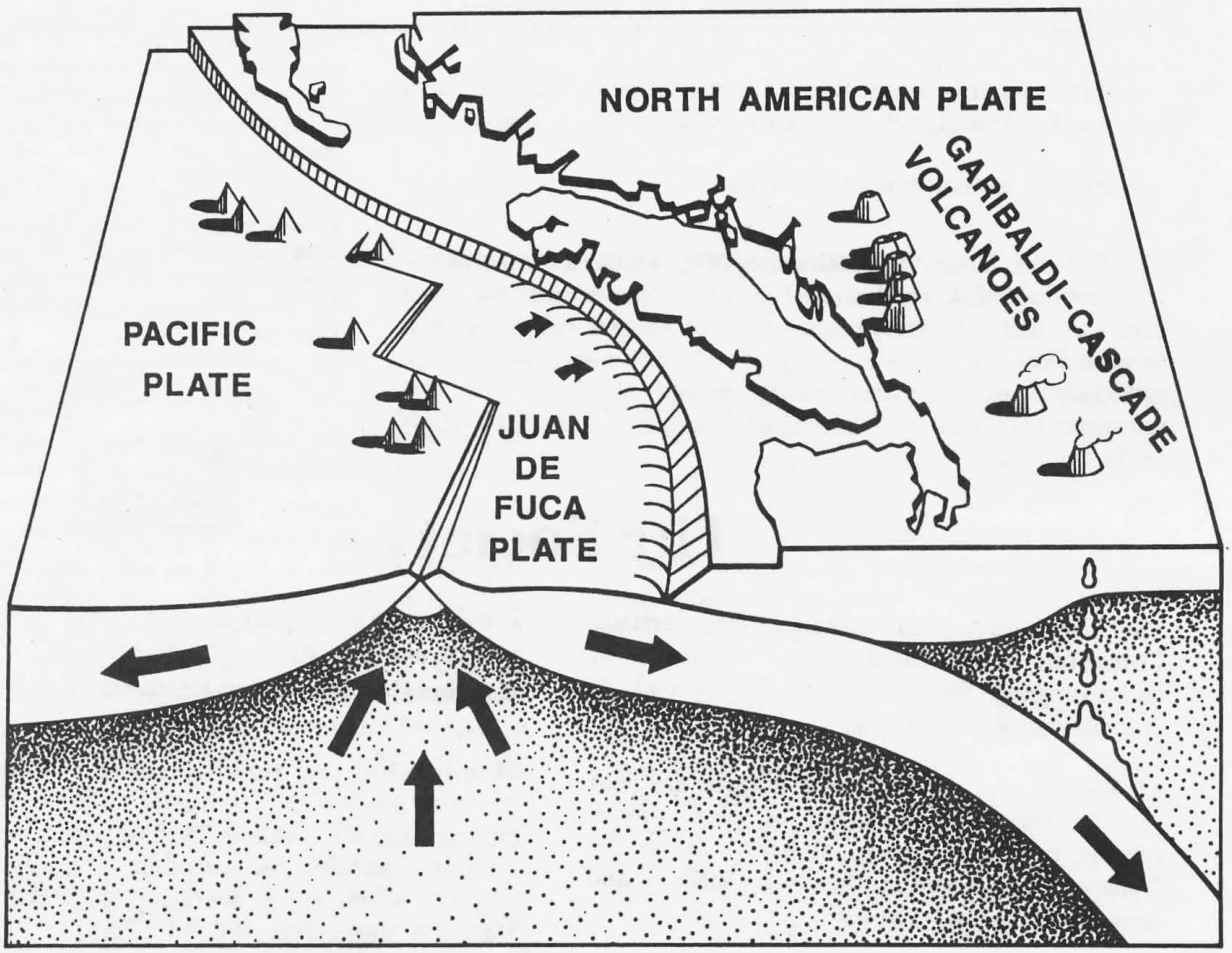

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The Midden

Publication of the Archaeological Society of British Columbia

Editor: Kathryn Bernick

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Submissions and exchange publications should be directed to the Editor. Contributions on subjects germane to B.C. archaeology are welcomed: maximum length 1,500 words, no footnotes, and only a brief bibliography (if necessary at all). Guidelines available. Telephone inquiries: 873-5958.

The next issue of *The Midden* will appear mid-October, 1989.

Contributors this issue: Brian Apland, Kathryn Bernick, Peter Bobrowsky, Douglas Hudson, Gary Nower, Garry Rogers.

Production assistance: Phyllis Mason.

THE COVER: *Subduction zone setting of the southern coastal region of British Columbia. The Juan de Fuca plate slides beneath the North American plate. A sudden large (tens of metres) relative motion between these plates constitutes a great subduction earthquake. Such earthquakes would involve strong ground shaking, uplift and subsidence over wide areas, numerous landslides and tsunami effects on the outer coast.*

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The Society

The **Archaeological Society of British Columbia** is dedicated to the protection of archaeological resources and the spread of archaeological knowledge.

Meetings featuring illustrated lectures are held on the second Wednesday of each month (except July and August) at 8:00 p.m. in the Vancouver Museum Auditorium. Visitors and new members are welcome!

NEXT MEETING:
September 13

President: Terry Spurgeon (464-1984)
Vice President: Bill Paull (980-5186)
Membership Secretary: Helen Smith (224-1426)

Membership year runs September 1 to August 31. Fees: single - $20.00; family - $25.00; senior citizen - $15.00; student - $15.00. Membership includes *Midden* subscription. Address to: A.S.B.C. Membership Secretary, P.O. Box 520, Station A, Vancouver, B.C. V6C 2N3.

Affiliated Chapters:

Fraser Valley. President: Bill Koberstein (859-1921). Secretary: Andy Purdy (823-4920).

Victoria. President: Shirley Cuthbertson (c/o Royal B.C. Museum).

We are sad to report that C. Moira Irvine, curatorial assistant at the UBC Laboratory of Archaeology and well-known to the B.C. archaeological community, died, courageously, on June 11, 1989, of recently diagnosed cancer.

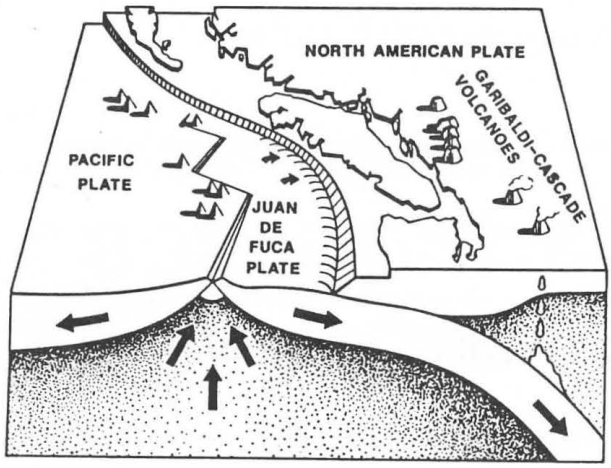
Prehistoric Earthquakes
in Southwestern British Columbia

by Peter T. Bobrowsky and Garry C. Rogers

DURING THE COURSE OF A YEAR, the Vancouver Island - Lower Mainland region experiences an average of one earthquake per day. Most of these seismic events are detected only by seismographs and are imperceptible to the people living in this area. Larger, damaging earthquakes also occur here, such as the 1918 (magnitude 7) and the 1946 (magnitude 7.3) earthquakes on Vancouver Island. Ongoing earthquake activity and the presence of majestic volcanoes, such as Mt. Garibaldi, Mt. Baker, and Mt. St. Helens, are evidence that southwestern B.C. and northwestern U.S.A. are part of a dynamic geological setting called the Cascadia Subduction Zone. Here, the Juan de Fuca Plate is thrust at a low angle (10°-20°) downwards beneath the North American Plate. Subduction zones around the globe are sites of the world's largest earthquakes, and evidence suggests that great subduction earthquakes may have occurred here.

The May 22, 1960 earthquake in Chile (magnitude 9.5) provides a chilling example of possible consequences of a large subduction earthquake. In that particular case, strong shaking lasted several minutes and tidal wave (tsunami) height reached up to 20 m in some places along the Chilean coast. After the earthquake, detailed observation indicated that in certain areas the Chilean coast had sunk in excess of 2 m (subsidence), whereas other areas were uplifted almost 6 m. Comparison to Chile is more than apt, as the Chilean coast and our own coast have many similarities in their geological settings.

The geological record for past large-magnitude earthquakes is likely generated by rapid subsidence or uplift and possible tsunami deposits. Recent study by the U.S. Geological Survey in large estuaries along the outer coast of Washington state has revealed buried peaty horizons (lowland paleosols) covered with 0.5 - 1.0 m thick intertidal deposits. In many cases, several such buried soils are evident, all with intervening intertidal sediments. Often, coarse sands and silts (usually offshore in origin) lie directly on top of the peaty soil surfaces. Initial ^{14}C dating of the soils indicates that the soils were buried at one of the following radio carbon dates: 300 B.P., 1000 B.P., 1500 B.P., 1700 B.P., 2500 B.P., 2800 B.P. and 3500 B.P. These paleosols indicate rapid submergence of the lowland surfaces, most likely caused by rapid



subsidence during a large earthquake. Coarse sediments capping the paleosols may represent material deposited by tsunamis associated with particular seismic events. If other sites of subsidence or uplift with the same radiocarbon ages can be found over large distances, then huge subduction earthquakes are likely the common cause.

The Geological Survey of Canada has initiated a program in British Columbia that aims to examine coastal deposits for evidence of prehistoric subduction zone earthquakes. Geological evidence such as that described for western Washington may also be present in Canada. Several other avenues of investigation may also prove productive in our research. For instance, historical records and ethnographic accounts are widely used in the Old World to determine the recurrence interval of seismic events. There are earthquake legends of the native peoples of coastal British Columbia, such as those associated with the Kwakiutl earthquake mask at the Museum of Anthropology, UBC, but no systematic documentation of these legends has taken place. There are also legends that appear to be tsunami-related, such as those from the outer Washington coast documented by Swan in 1868, and from the Alberni Inlet region, described by Sproat in 1868. Individuals well-versed in the local ethnographic and historic literature may know whether earthquake and tsunami events are recorded. If large earthquakes have affected the West Coast in the last few hundred years, more evidence is expected.

Archaeological evidence is a good candidate for increasing our knowledge of past vertical movements. Coastal sites that were occupied during a subduction zone earthquake may contain physical evidence of rapid subsidence in the form of intertidal muds interbedded with supratidal beach sediments such as shelly debris. Careful re-examination of already excavated sites and an awareness of such evidence during future excavations may prove productive. Landslides, slumping, and localized liquefaction of sediments commonly result from all types of earthquakes and may also be recorded within or near archaeological deposits. How many other sites such as Ozette (520 B.P.) are intimately associated with a natural disaster such as a mudslide? We at the Geological Survey of Canada are interested in being alerted to any deposits, whether archaeological or geological, that contain datable materials where we can establish the amount of subsidence or uplift relative to sea level.

On a broader scale, settlement and subsistence patterns could show a shift when examined in the context of periods preceding, during, and following a subduction zone earthquake. Earthquakes have never been responsible for the demise of an entire civilization, but undoubtedly such events have had profound effects on the day-to-day activities, economics, and residence of local peoples. Hypothetically, as a consequence of a large subduction zone earthquake, we would expect coastal sites located in areas of abrupt subsidence and those exposed to the devastating tsunamis to be quickly abandoned. Habitation and shoreline-related activities would be forced "inland," toward the newly developed coastlines (higher ground). Conversely, land subjected to rapid uplift would be abandoned as the inhabitants moved to lower ground to maintain their nearshore residence. Although complex, the archaeological record (inland, coastal, and submarine sites) should become decipherable given dating control for past occupation and abandonment.

In theory, the pattern of coastal occupation should be punctuated by prehistoric occupation of inland sites at particular time intervals, perhaps synchronous with those of the previously cited Washington paleosols. The

requirements to test such a model are a detailed knowledge of coastal and inland site distribution relative to sea level and controlled dating of site occupation and abandonment. For instance, on Gabriola Island, a shift in midden use at the False Narrows site occurred between 1600 B.P. and 1800 B.P. This may have been caused by differential subsidence and uplift associated witha subduction zone earthquake 1,700 years ago. How local peoples would have adapted to large magnitude earthquakes and the accompanying tsunamis during our prehistoric past offers a fascinating avenue of research in southwestern British Columbia.

At this early stage of study, contributions in the form of ideas and observations from both the avocational and professional archaeological community in B.C. would greatly assist our work. Our own emphasis on geological observations precludes adequate evaluation of the cultural resource database, but such evidence should not be overlooked. It plays a key role in our ability to assess the potential of a large magnitude earthquake occurring in southwestern British Columbia sometime in the future. □

Peter Bobrowsky is a postdoctoral research fellow and Garry Rogers is a research scientist at the Geological Survey of Canada, Pacific Geoscience Centre, Sidney, B.C. V8L 4B2. Interested readers may contact either author at 356-6500.

Circum-Pacific Prehistory Conference

AN INTERNATIONAL ANTHROPOLOGICAL conference on past human culture will be held August 2-6, 1989 in Seattle, Washington. More than 150 researchers from around the Pacific will present the latest ideas on the development of complex maritime societies and formative civilizations, human evolution in eastern Asia, trans-Pacific contacts, and many other topics.

Extras include public talks, pre- and post-conference tours, and the *Cross-Roads of Continents* exhibit now showing at the Seattle Center. For more information contact Dr. Dale Croes, Conference Coordinator, c/o Washington Centennial Pacific Celebration, 1001 4th Ave. Plaza, Seattle, Washington 98154-1001. Tel (206) 464-6580.

New Publication

The J. Puddleduck Site: A Northern Strait of Georgia Locarno Beach Component and its Predecessor by Donald Mitchell. Contributions to Human History No.2, Royal B.C. Museum, Victoria. 20 pp., ills. $1.80.

Technical report of 1978 and 1981 excavations at *DkSf26* in Courtenay, B.C.

B.C. writer wins again

THE CANADIAN ARCHAEOLOGICAL ASSOCIATION'S Public Writing Award for 1988 went to two journalists, one from the east and one from the west. Each receives $250.

Heather Pringle of Vancouver has won the award twice before. Her prizewinning article this time is a feature on Head Smashed in Buffalo Jump and other similar sites around the world; *Boneyard Enigama* in the March/April 1988 issue of **Equinox.**

A series of three newspaper articles on archaeological excavations in Nova Scotia, written by Belle Hatfield and published in the **Yarmouth Vanguard** also won an award: *Archaeologists probing Chegoggin Area for Indian Settlement* (August 16, 1988); *In Search of Past Cultures and Act Protects Sites in Nova Scotia* (Sept. 6, 1988); and *Archaeologists Date 2000 Year Old Chegoggin Site* (Sept. 29, 1988).

A special merit award was presented to Deborah Evaluarjuk for *Excavation Saves Threatened Archaeological Site* published in the spring 1988 issue of **Inuktitut.**

David Pokotylo, outgoing chair of the CAA's public writing award committee, told *The Midden* that because it is difficult to compare articles in different types of publications, from now on there will be two $250 awards, one for a magazine story and one for an article published in a newspaper. The merit award (no money!) will be given to the best article written by or commissioned by a professional archaeologist. □

News Bits

Archaeologists head north

David Archer (U. of Calgary) is conducting a site survey this summer in Kitkatla territory on southern Porcher Island, for the Tsimshian Tribal Council. Gary Coupland (U. of Toronto) plans to do preliminary testing of village middens in Prince Rupert Harbour to identify sites for a proposed research project.

DgRr1 goes public

The B.C. Heritage Trust is funding an interpretation project at the Crescent Beach site this summer where UBC archaeology students under R.G. Matson are excavating a portion of the site. Students from the Semiahmoo Indian Reserve and the local community will be working as site interpreters. School tours begin in June, public tours in July and August. For more information contact Margaret Holm at 734-9489 (evenings).

Debitage

Royal B.C. Museum publications scheduled for the coming year include a pictorial history of the Songhees by **Grant Keddie and Dan Savard** . . . ASBC member **Ann Stevenson** joins the ranks of emigrant B.C. archaeologists on the other side of the mountains. She was recently appointed Assistant Curator in the Ethnology Department of the Glenbow Museum in Calgary . . . **The B.C. Heritage Trust** is redeeming itself this year, but the recently issued 1987/88 annual report lists only one project under Archaeology Programs—a project that never happened. . . . The shiny new bronze plaque commemorating **Charles Borden** with which the ASBC will replace the Vancouver Centennial Commission's deteriorating multicoloured plaque at Locarno Beach, will be installed in the fall—when archaeologists now in the field can attend the ceremony.

ARCAS digs in Tsawwassen

SALVAGE EXCAVATIONS at the Tsawwassen midden site *DgRs 2* began in June and will continue through early August in order to recover as much data as possible from an area of the site that will be disturbed by road construction.

Based on the results of limited testing last year, Arcas Associates has developed a research design aimed at gaining a better understanding of the transition between the Marpole and Gulf of Georgia culture types. These are the two most recent prehistoric phases in the Lower Mainland - Gulf of Georgia area. Both are present at the Tsawwassen site.

Arcas Associates, which is conducting the work under contract for the B.C. Ministry of Highways, hired a crew of 15 that includes 5 members of the Tsawwassen Indian Band. They have also lined up a team of experts to conduct specialized analyses—of the faunal remains, botanical remains, and burials they already know they will find—and waterlogged artifacts, which may be present.

Arcas partner Arnoud Stryd told *The Midden* that the recovered material will be stored at the UBC Laboratory of Archaeology after he has concluded the analysis. A report will be available in March 1990.

Although safety concerns (road construction work has already started) preclude a full-scale public program, someone will be on hand Monday through Friday, 8:30am- 4:30pm, to guide visitors around the site. Anyone who wishes to see the excavation in progress should stop at the Arcas trailer at the foot of the ferry causeway and ask for the "public liaison person." □

Radiocarbon Dating

at Simon Fraser University

by Gary P. Nower

THE RADIOCARBON DATING LABORATORY at Simon Fraser University was established in 1978 to complement the Department of Archaeology and applied research in the field of archaeology. As there is a considerable amount of research being done on west coast archaeology, and most of the material is within the range of radiocarbon dating, the lab is in great demand.

Theory

The primary source of ^{14}C is the transitional region between the stratosphere and the troposphere. ^{14}C is formed by the capture of a cosmic ray produced neutron on nitrogen 14 (^{14}N) resulting in the creation of a ^{14}C atom. The ^{14}C atoms become oxidized to form $^{14}CO_2$ molecules. These molecules mix with atmospheric carbon dioxide and are distributed through the biosphere and hydrosphere.

From the atmospheric production of ^{14}C to the final decay, there is a continuous stream of ^{14}C. Since the process has been going on for a very long time (1.5×10^9 years), the production of ^{14}C and the decay of ^{14}C are in equilibrium; therefore, the production rate and decay rate are the same. Although this state maintains a more or less constant ^{14}C concentration in carbon-containing material such as terrestrial plant material, oceanic bicarbonate, and animals, it does not mean the various materials have equal amounts of carbon. The differences occur because of different exchange rates between carbon reservoirs.

Under certain conditions, ^{14}C concentrations are reported as activities that can be defined as ^{14}C disintegrations per minute per gram of carbon. However, the radiocarbon age of a sample is the residual ^{14}C activity, A_S, related to the ^{14}C activity, A_O, of the carbon reservoir.

The mathematical expression of the relationship is:

$$A_S = A_O e^{\lambda t}$$

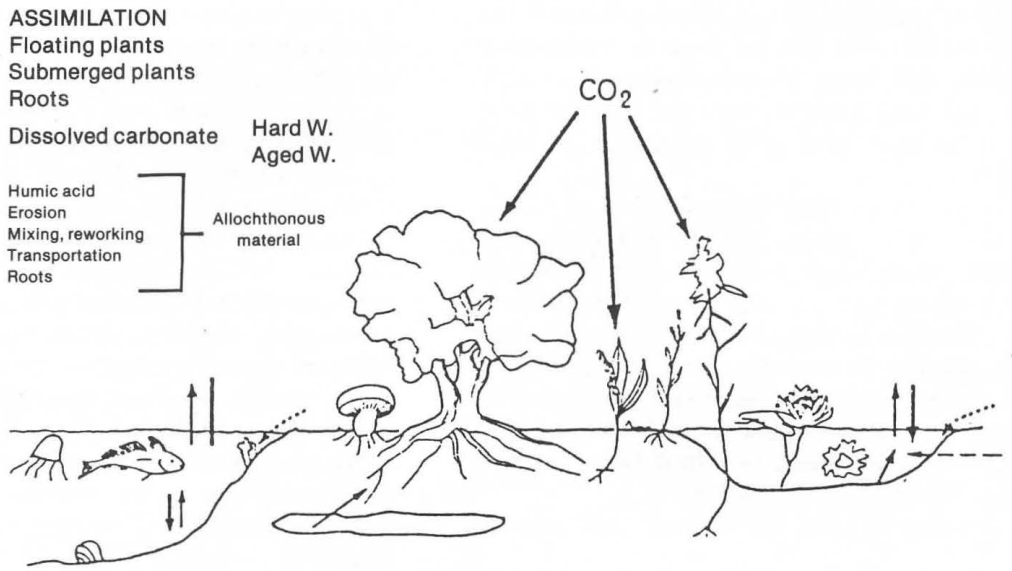
Where,

t = years elapsed since the sample was removed from the dynamic carbon reservoir.

A_O is the initial activity of ^{14}C and A_S is the measured activity of the sample.

λ is the decay constant. λ is related to the $t_{1/2}$ of ^{14}C which is 5730 ± 40.

When radiocarbon dating was introduced, the best estimate of $t_{1/2}$ was 5568. By convention, this value is still used.



Methodology

The method employed for ^{14}C measurement at SFU is liquid scintillation. Carbon dioxide is converted to benzene and counted in a liquid scintillation counter. Methods such as gas proportional counting and accelerator mass spectrometry are also widely used; however, only the liquid scintillation technique will be described.

Sampling and Contamination

The goal of a radiocarbon lab is to provide an accurate measurement of the residual ^{14}C in a sample and report the appropriate age. There are many steps involved before a lab can report a measurement, including sampling, pretreatment, conversion to benzene, and determination of the activity. Each step in the lab is carried out with extreme care, but if the initial step of sampling is done incorrectly, or if a poor sample is submitted, the effort is wasted and the result meaningless.

Samples submitted for measurement are mainly wood, charcoal (incompletely burned wood), peat, sediments, bone, and inorganic carbonates. It is fundamental to have an appropriate amount of sample if a precise measurement is to be done. Since different materials contain different amounts of carbon, sample size will differ from material to material.

Table 1

Sample Size Needed for Radiocarbon Measurement

Material	*Minimum wt. (g)*	*Desirable wt. (g)*
Wood	5	30
Charcoal		
black	2	10-20
brown	10	50-200
Shell		
hard	20	100
powdery	30	200
Grass	5	50
Paper/Cloth	3	30
Peat/Gyttja, brown	3/30	120
Bone		
hard	60	200
porous	150	300
Collagen, powdery	3	15
Soil-organic	100	250
Soil-inorganic	300	500

The collection of a sample is the part of the process most open to error. It is extremely important that the objectives of radiocarbon dating be well thought out before going into the field. Ideally, this can be done in conjunction with the lab doing the measurements. Forms from the lab should be brought into the field and completed with great care, one for each sample.

Contamination must be avoided at all times, as this will result in an incorrect age determination. Care must be taken to ensure that samples contain only the carbon present from the time of deposition. If the sample has been affected by post-depositional factors, it is said to be contaminated. Contamination can arise from poor sampling techniques as well as from the environment in which the sample is found. To avoid contamination:

1) Ensure all tools are cleaned well prior to use;

2) Avoid smoking, eating, and other consumer activities when sampling;

3) Place samples in suitable metal containers, or wrap the samples in aluminum foil. These materials are best since they contain no carbon;

4) Avoid physically handling sample material.

Table 2

Environmental Contamination Factors

Contamination	*Cause*	*Effect*
Solution	rain	younger
Solution	ground water	inconclusive
Intrusive	rootlets	younger
Deposition	young sediments	younger
Deposition	old sediments	older
Deposition	coal/limestone	much older
Exchange	—	older/younger

Sample Preparation

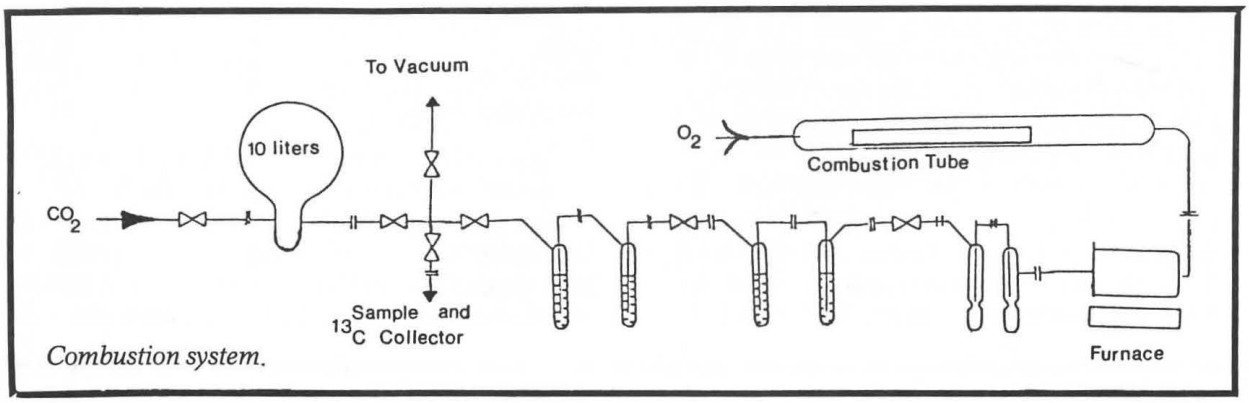
Since most material used for ^{14}C measurement has been altered in some way by post depositional factors, it is necessary to treat the sample to ensure that original carbon, from the time of deposition, remains. Considering the varying amounts of material routinely submitted to the lab, it is difficult to apply a uniform technique to all types of materials. As a result, different methods of treatment are used.

The amount of contamination present often depends on the type of material and the environment in which it was found. Rootlets are common in charcoal, wood, and soil samples, whereas algae are common for corals. Physical pretreatment involves removal of obvious contaminants such as rootlets and algae by hand picking or scraping. Depending on the material, each sample may be washed with distilled water to remove mud or dust, or wet-sieved to remove intrusives.

After physical removal of obvious contaminants, the sample must be treated chemically to remove any chemical impurities that may be present. For wood, charcoal, peat, and most sediments, a method called A/A/A (Acid, Alkali, Acid) is used.

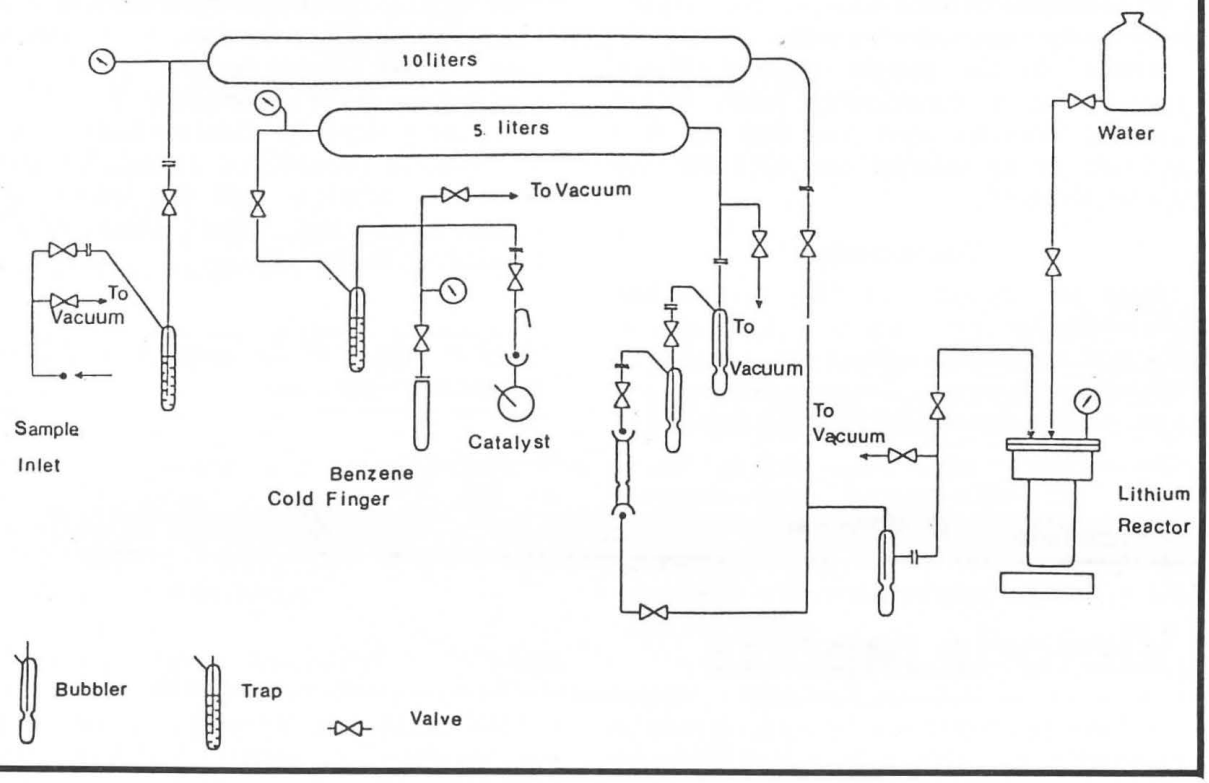
Shells and corals must be treated in a different manner than organics. The exterior of the material is treated with a dilute weak acid to remove the outer layer of carbonate. It is this outer layer that may have exchanged with carbonate in the environment. The shell is then ground to a fine powder and is ready for conversion to CO_2.

Collagen, the organic fraction of bone, is a material commonly used for dating. The collagen is extracted by a modified Longin method. The collagen is then used for combustion and conversion to benzene.



Combustion system.

Benzene synthesis system



Benzene Synthesis

After chemical and physical pretreatment, the sample is converted to carbon dioxide. For organic material, the sample is converted to CO_2 by means of combustion in a quartz tube in the presence of pure oxygen. The gas is then passed over copper oxide (CuO) at 650°C, dried by traps at -78°C and collected over liquid nitrogen. The volume of the sample gas can then be measured, and, if necessary, ^{14}C-free CO_2 can be added to make up the correct volume. In the case of inorganics, such as carbonates from waters and shells, the carbonate is placed in a previously evacuated 2L flask and 95% phosphoric acid is added. The CO_2 produced is treated in the same manner as organic CO_2.

The next step in the synthesis is the conversion of CO_2 to acetylene. The CO_2 is reacted with molten lithium metal at 600°C to form lithium carbide.

The temperature is increased to 900°C to complete the reaction. After the reaction vessel has cooled to room temperature, the lithium carbide (Li_2C_2) is hydrolized to form acetylene.

The acetylene produced is dried by a cold trap at -80°C and placed in a 5L flask. The acetylene is converted to benzene by reaction with a catalyst.

Once all the acetylene has reacted with the catalyst, the benzene is distilled at 120°C and frozen into a cold finger. The amount of benzene is weighed and its radioactivity is measured.

Measurement of Sample Activity

The counting system used at SFU is an L.K.B. Rack Beta Liquid Scintillation Counter (L.S.C.), model #1218. The 1218 is a multichannel, multi-parameter L.S.C. It allows for 4*168 channels. These can be used for windowless counting, or counting up to four preset windows over the entire energy range. Samples are counted in teflon vials. These vials were selected for their similar weights and backgrounds. The

background value for each vial and for the entire system is monitored regularly. These values are used in the determination of the net sample activity. For actual sample measurement, each batch of samples is counted with a background and a standard. The vials are individually counted for 15-100 minute intervals. If the sample requires higher precision or is considerably older, longer counting times are used. The data are then analyzed by an external computer and the results calculated.

Conclusions

Since its opening, the SFU Radiocarbon Laboratory has undergone several changes. A modified combustion system was installed to process a wide variety of organic materials and a gas dilution system was built and installed in the laboratory. The facility can measure up to two hundred samples per year. The laboratory is a member of the Canadian Radiocarbon Data Base Committee, which is working towards a global radiocarbon data base system.

Research in the laboratory is focused on the effects of cremation on human remains and how they are affected isotopically, as well as different aspects of methodology. Plans for the future are to introduce direct counting of ^{14}C by absorption in a scintillation cocktail. It is hoped that this technique will be beneficial to archaeologists and other users of the radiocarbon facility. □

Gary P. Nower is the manager of the SFU Radiocarbon Laboratory.

Victoria reports

I have completed an informal survey of archaeological activities in British Columbia during the 1988/89 fiscal year. It was a very informal survey and the results indicate trends only, not accurate values with respect to actual expenditures as there are numerous archaeology-related projects not technically requiring permits that, by virtue of size, jurisdiction, or other reasons, may not be brought to our attention (i.e., land claims studies conducted by Indian bands).

There were 16 independent consultants, 7 Indian band organizations, and 15 institution-based researchers (SFU, 2; UBC, 3; Univ of Calgary, 2; Canadian Parks Service, 2; UASBC, 2) active last year. The total estimated expenditures, excluding staff salaries and operating budgets of the Branch, provincial museum, and academic institutions, was about $1.2 million (up 13% from 87/88). The expenditures break down as follows: 46% directly through private consultants (down 18% from 87/88); 35% through institutions (up 5%); and 19% through native organizations (up 13%).

The breakdown by project type is: 60% resource management (down 7%); 33% research (up 6%); 7% public interpretation (up 1%). Although the proportion of spending shifted slightly, mainly between resource management and research, total expenditures in all three areas were up over 1987/88 (resource management up 3.3%, research up 31%, public interpretation up 13%). The proportionate differences from the previous fiscal year primarily reflect more and larger research grants, as well as considerable expenditures by the Canadian Parks Service on research associated with the Chilkoot Trail.

The Archaeology and Outdoor Recreation Branch directly provided 13% of all expenditures (primarily for resource management), the B.C. Heritage Trust provided 8.5% (primarily for research and public interpretation), and the new Heritage Properties Branch 0.4% (all for research). The remaining 78% (up 6% from 87/88) was provided by development proponents and research grants external to the province. □

- Brian Apland, Director
Archaeology and Outdoor Recreation Branch

Book Review

Informative and welcome

Native Peoples and Cultures of Canada: An Anthropological Overview, by Alan D. McMillan. Douglas & McIntyre, Vancouver. 1988. 340 pp., ills., bibl., index. $34.95 (hardcover), $19.95 (paper).

ALAN MCMILLAN, who teaches anthropology at Douglas College, in New Westminster, B.C., has written a readable and comprehensive overview of native cultures in Canada, covering a wide range of topics—lauguage, archaeology, culture, and contemporary issues. The book starts with a chapter on the distribution of native groups (based on language), describes the early archaeological evidence for human populations in North America, and then takes the reader from east to west (and north) describing the archaeological record, traditional cultures, changes due to European influences and the expansion of the Canadian state, and contemporary issues in the Atlantic region, Eastern Woodlands, Eastern Subarctic, Plains, Plateau, Northwest Coast, Western Subarctic, and the Arctic. British Columbia is well-represented as along the way the reader encounters Coast Salish, Interior Salish, Kutenai, Carrier, Haida, and others.

McMillan includes an important chapter on the Metis, a group too often ignored in large texts that try to give a North American (as opposed to Canadian) overview. The book concludes with a separate chapter on contemporary issues, which should be useful in putting the Stein Valley conflict, for example, into a larger context. He also has other interesting sections too often left out of studies of native cultures. One is a brief overview of some of the anthropologists whose writings contributed so much to the pictures of native cultures—Boas, Jenness, Barbeau. Another describes how archaeological information is used to piece together a picture of the past—and the limits of the archaeological material in doing that in Canada.

The inevitable comparison will be with the anthropological classic, *Indians of Canada* by Diamond Jenness, which McMillan points out was written in an earlier, somewhat pessimistic era when the demise of native cultures and peoples was felt to be inevitable. McMillan's book is an important update, showing that the future did not unfold as predicted, and a reminder that many issues remain unresolved today.

The book is well written and illustrated, and will undoubtedly be used in many college and university courses. Just as important, the author has written the book in a style that makes the information available to the larger reading audience. McMillan's informative book is a welcome addition to a growing literature on indigenous peoples in Canada. □

- Douglas Hudson

Dr. Douglas Hudson, a member of the Fraser Valley ASBC, teaches Anthropology at Fraser Valley College, Abbotsford, B.C. He has published articles on Okanagan, Carrier, and Nisga'a societies and is currently preparing a reader on contemporary B.C. Native issues.

PERMITS • PERMITS • PERMITS • PERMITS • PERMITS

Permits issued by the B.C. Archaeology Branch January through May 1989:

1989- 1 Mark Skinner: recovery of human skeletal remains

1989- 2 Ian Wilson: impact assessment, logging block, Naden Harbour, Queen Charlotte Islands

1989- 3 Jean Bussey: impact assessment, Canadian Hunter Exploration Ltd. well sites, northeastern B.C.

1989- 4 Morley Eldridge: site evaluation, East Coast Interceptor.

1989- 5 Ian Wilson: detailed survey, Shell pipeline west of Wonowon.

1989- 6 Ian Wilson: systematic data recovery at *DdRu 61,* Thomson Cove, Saanich Peninsula.

1989- 7 Jean Bussey: Phillips Petroleum well sites, Stoddart Creek - Charlie Lake confluence area.

1989- 8 Keary Walde: monitoring pipeline construction at Placer CEGO well site *(HbRb 3).*

1989- 9 Keary Walde: post-construction impact assessment of Ogy Petroleum pipeline right of way, vicinity of Cecil Lake.

1989-10 Morley Eldridge: survey, *DfRu 13* and *DfRu 22,* Montague Harbour Provincial Marine Park.

1989-11 Bjorn Simonsen: impact assessment, Gardner's Pond, North Saanich.

1989-12 Jean Bussey: impact assessment, Texaco Canada well sites, northeastern B.C.

1989-13 Arnoud Stryd: impact assessment, proposed bridge near Squilax, B.C.

1989-14 Bjorn Simonsen: impact assessment, proposed bridge and access, Hazelton, B.C.

1989-15 Arnoud Stryd: impact assessment, proposed golf course and subdivision development northeast of Kamloops.

1989-16 Arnoud Stryd: impact assessment, B.C. Hydro Darfield and Albreda Transmountain Pipeline.

1989-17 Arnoud Stryd: impact assessment, Lakeview Estates subdivision near Adventure Bay on Okanagan Lake.

1989-18 John Dewhirst: impact assessment, Anderson Cove property *(DcRv 69),* East Sooke.

1989-19 Sandra Zacharias: impact assessment, The Glades, Surrey.

1989-20 Ian Wilson: impact assessment, Betty Cove, Bonwick Island.

1989-21 Keary Walde: impact assessment, petroleum and natural gas lease sites in northeastern B.C.

1989-22 Ed McCullough: impact assessment, Peace pipeline, Dawson Creek to Alberta.

1989-23 Ian Wilson: systematic data recover, *EeSq 1,* Betty Cove, Bonwick Island.

1989-24 Ian Wilson: impact assessment, Taylor petrochemical plant.

1989-25 Arnoud Stryd: impact assessment, proposed subdivision, Park Rd., Deroche.

1989-26 Sandra Zacharias: impact assessment, proposed subdivision, Shuswap Lake and Corning Creek.

1989-27 R.G. Matson: excavations at Crescent Beach *(DgRr 1).*

1989-28 E. Nicholls: assessment of fossil site near Courtenay.

1989-29 Brian Hayden: excavations at Keatley Creek *(EeRl 7).*

1989-30 Wayne Choquette: impact assessment, proposed highway and bridge near Vallican, confluence of Slocan and Little Slocan rivers.

1989-31 Terry Spurgeon and Colin Gurnsey: survey, Hayward Lake area.

1989-32 Morley Eldridge: impact assessment, Nangoose Forest service road and cutblock near Hazelton.

1989-33 Arnoud Stryd: impact assessment, Little Hell's Gate regional park development.

1989-34 Lindsay Oliver and C.J. Knusel: recovery of human skeletal remains and associated artifacts.

1989-35 Keary Walde: impact assessment, Louisiana-Pacific waferboard plant site, East Pine.

1989-36 Bjorn Simonsen: impact assessment, proposed subdivision near Englishman River, Nanoose District.

Sites to See this Summer

- **Crescent Beach:** Dr. R.G. Matson's research excavations and UBC field school. Public program coordinated by Margaret Holm (734-9489) in July and August. The site is in Crescent Beach on Bayview St., just before the railway tracks.

- **Tsawwassen:** Salvage excavations at 2000-year-old midden. Mon.–Fri., June 5 through early August. Visitors requested to check in at the Arcas trailer parked at the foot of the ferry causeway.

- **D'arcy Island:** Diana French (UBC) is excavating a 100-year-old leper colony that was inhabited mainly by Chinese immigrants. Visitors welcome, 7 days a week, early June through July 31. Boat access on the north end of D'arcy Island, which is south of Sidney Island.

- **San Juan Island:** Univ. of Washington's ongoing excavations at a large prehistoric midden in San Juan National Historic Park, directed by Dr. Julie Stein. Guided tours Thurs. - Mon., 9am - 5pm. Ask for directions at the National Park Service office in Friday Harbor.

- **Keatley Creek:** Dr. Brian Hayden's research excavations and SFU field school at large pit house village site near Lillooet. Mon.-Fri., through August 5. Directions from SFU Archaeology Dept. (291-3135).

- **Bella Coola River Valley:** SFU research excavations and field school directed by Phil Hobler at late prehistoric - early historic sites. Directions from the Bella Coola Cultural Centre. Sat. - Wed. through August 5.

Show Time/Current Exhibits:

Vancouver Maritime Museum

TREASURES OF THE KRONAN—an exhibition from the Kalmar Lans Museum, Sweden, displaying some of the fascinating artifacts recovered from the 17th century warship *Kronan*. Through September 4.

Chilliwack Museum

STO:LO, The River People—photos and artifacts reflecting contemporary and past Sto:lo culture. Cooperative display put on by the Chilliwack Museum, Sto:lo Tribal Council, and Coqualeetza Native Education Training Centre. Mon.-Sat., through June 23, 1989.

Gallery of Tribal Art (1521 W. 8th Ave., Vancouver)

FEASTWEAR—traditional button robes and contemporary fashion garments created by Haida artist Dorothy Grant using motifs designed by her husband, Robert Davidson. Tues.–Sat., 10-6 pm., through June 28.

The Midden
P.O. Box 520
Station A
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V6C 2N3