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The First Helicopter Lift of an Alberta Dinosaur



Remembering
Captain
Gordon C. Walker
1923–1970

ALBERTA PALAEOLOGICAL SOCIETY

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The Society was incorporated in 1986, as a non-profit organization formed to:

- a. Promote the science of palaeontology through study and education.
- b. Make contributions to the science by:
 - 1) Discovery
 - 2) Collection
 - 3) Description
 - 4) Education of the general public
 - 5) Preservation of material for study and the future
- c. Provide information and expertise to other collectors.
- d. Work with professionals at museums and universities to add to the palaeontological collections of the province (preserve Alberta's heritage).

MEMBERSHIP: Any person with a sincere interest in palaeontology is eligible to present their application for membership in the Society. (Please enclose membership dues with your request for application.)

Single membership \$20.00 annually
Family or Institution \$25.00 annually

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NOTICE: Readers are advised that opinions expressed in the articles are those of the author and do not necessarily reflect the viewpoint of the Society. Except for articles marked "Copyright ©," reprinting of articles by exchange bulletins is permitted, as long as credit is given.

Upcoming APS Meetings

Meetings take place at 7:30 P.M. in **Room B108,**
Mount Royal University, 4825 Mount Royal Gate SW, Calgary, Alberta.

Friday, May 13, 2011—Dan Quinsey, Alberta Palaeontological Society:
Moose Mountain Alberta—Exploring the Natural History of Canyon Creek and Area
(See Page 3).

Friday, May 13, 2011—APS Annual General Meeting and Elections (See Page 3).

June, July, August, 2011—No meetings. See Field Trips, Page 7.

ON THE COVER: Historic first lift of an ornithomimid dinosaur skeleton from the Red Deer River badlands in 1967 by a Canadian military heavy-lift helicopter, piloted by Captain Gordon C. Walker. Main photo by Alan Lindoe, courtesy of Dr. Philip Currie. Photo of Captain Walker by Department of National Defense, courtesy of Bill Walker. Design by Howard Allen. See article, Page 8.

Upcoming Events

May

Dan Quinsey

Alberta Palaeontological Society

Moose Mountain, Alberta— Exploring the Natural History of Canyon Creek and Area

Friday, May 13, 2011, 7:30 P.M.

Mount Royal University, Room B108

The lure of the mountains and foothills affects us all. Most of us are familiar with the upper and lower foothill regions of Alberta adjacent to the Rocky Mountains which, together with the Rockies, are commonly referred to as the Eastern Slopes. The foothills are not only home to some of the most interesting species in the province, including the most inland race of grizzly bears in North America, they hold within them evidence of ancient times.

Uncovered within the lower foothill regions of Alberta are the Carboniferous and Jurassic formations along Canyon Creek at Moose Mountain, where many geological and palaeontological wonders wait to be experienced and discovered.

The objective of this talk is to offer fellow enthusiasts an opportunity to experience the magnificence of Canyon Creek, Moose Mountain. The focus will be on the geological and palaeontological features of the area, a brief survey of the exploration history, and a look at the common flora and fauna along the way.

Biography:

Dan Quinsey has been a member of the Alberta Palaeontological Society for over ten years and currently holds the positions of Past President and Chairperson of the Public Outreach / Education Committee. Dan has a Baccalaureate in palaeontology from Mount Royal University, Degrees in Business Management from Chinook Learning Services and Electronic Data Processing from Loyalist College, and Undergraduate Degrees in Systems Analysis and Design and Architectural Drafting also

from Loyalist College.

Current and previous affiliations include the Tyrrell Museum of Palaeontology, Calgary Junior Chamber of Commerce—JAYCEES, Calgary Philatelic Society, and Big Brothers and Big Sisters of Calgary and Area.

Dan has published work in *Deposits Magazine* (UK), Kick-started the *APS Guide to Common Vertebrate Fossils from the Cretaceous of Alberta* book project, and is currently working on another book titled *Moose Mountain, Alberta—Exploring the Natural History of Canyon Creek and Area*.

APS Elections

By Dan Quinsey, Past President

Our Annual General Meeting (AGM) is just around the corner and with it comes APS Elections. Any eligible Member (Membership dues must be paid in full prior to the May Executive Meeting) may be nominated for Officer and Director positions. The positions open to nominations this year are: President; Vice-President; Treasurer; Secretary; Program Co-ordinator; and Field Trip Co-ordinator (the position of Field Trip Co-Ordinator was not filled last year and **Wayne Braunberger** took on the position on an interim basis for one year). The positions of Membership Director and Editor will be serving the second year of a two-year term and are not eligible for nominations this year. Chairperson positions are appointed by the Board and are not usually discussed during the AGM.

To refresh everyone's memory, APS Bylaws regarding voting, elections and the positions of Officers and Directors are detailed at the end of this article.

If you would like to chat about the possibility of serving on the Alberta Palaeontological Society Board of Directors, to step forward to nominate a Member or to be nominated for any of the open positions, please contact me any time by e-mail or telephone. All inquiries will be held in confidence.

Volunteering is the best work of life!

2.2 Voting

Each Voting Member* 18 years of age or older shall be entitled to one vote at any General Meeting, Annual General Meeting, or Special Meeting of the Society. Voting for the election of the Board shall be done by secret ballot for each position of Officer or Director where more than one Member is nominated; otherwise, all Members nominated shall be elected by acclamation. All other voting shall be done by show of hands, unless a secret bal-

lot is requested by any five Members. Such votes must be made in person and not by proxy or otherwise. The Chairperson shall cast a vote only in the event of a tie.

* Single Memberships (an individual person 18 years of age or older) of which the Member has only one vote; and Family Memberships (offered to a group of people living in one household consisting of no more than two adults 18 years of age or older and their dependants (if any) under the age of 18) of which each adult Member has one vote.

5.7 Nomination and Election of Officers and Directors

Nominations for Officers and Directors, and the offices associated with each such office, shall be made by the Past-President or by a Nominating Committee composed of a Chairperson, appointed by the Board at a properly Constituted Board Meeting, and at least one Member selected by such Chairperson with the advice and consent of the Board. The Past-President or Nominating Committee shall present a slate of nominees to the floor at the Annual General Meeting after which one final call for nominations shall be made. A professional palaeontologist may be nominated for the office of President only if an amateur palaeontologist is not nominated. All seconded nominations shall be voted upon with those nominated by the Past-President or Nominating Committee. Voting shall be done in accordance with Article 2.2. A motion to ratify the election results must be approved by the Voting Members in attendance at the Annual General Meeting to ratify the election process.

5.8 Eligibility

No Member shall be eligible to hold the office of an Officer or Director unless they have been a Member in good standing for at least one year, or by an affirmative vote of the Board at a properly Constituted Board Meeting. Members who earn a living from the sale, trade, or barter of palaeontological resources shall not be eligible to hold the office of an Officer or Director.

5.9 Term Commencement

Term commencement of elected Officers and Directors shall be September 01 of the calendar year.

6.1 General

The Officers and Directors of the Society shall provide regular and timely reports to the Board respecting the affairs, policies, programs, and activities of the Society.

6.2 Positions

Under the provisions of Articles 5.7 and 5.8, the Society shall elect the following Officers: President, Vice-President, Secretary, and Treasurer; and the following Directors: Membership Director, Editor, Program Co-ordinator, Field Trip Co-ordinator, and (if created by the Society as described in Article 6.13) Director at Large. The position of Past-President is automatically filled by the exiting President of the Board. Directorships other than the ones listed above may be added or removed from time to time in accordance with Articles 5.1 and 6.13 by an affirmative vote of three-quarters of the Society Members present at any properly Constituted Annual General Meeting or Special Meeting.

6.3 Term

Officers shall be elected for a term of one year. Directors shall be elected for a term of two years. The term of the Past-President ends when a new President is elected. There shall be no restriction on the number of terms an Officer or Director may serve.

6.4 President

The President shall chair all Board and General Meetings of the Society. The President shall be an ex-officio member of all Committees of the Society. The President shall act as the spokesperson for the Society. The President shall approve all records of the Society. The President shall also perform all duties assigned to this office by the Board. In the absence of the President, the Vice-President shall preside in their place. In the absence of both the President and Vice-President, a Chairperson may be elected to preside by a Majority show of hands of the Voting Members present at any General Meeting.

6.5 Vice-President

In the absence of the President, the Vice-President shall chair all Board and General Meetings of the Society and perform all duties of President. The Vice-President shall also perform all duties assigned to this office by the Board.

6.6 Secretary

The Secretary shall keep the minutes of all Board Meetings, General Meetings, Special Meetings, and the Annual General Meeting of the Society. The Secretary shall make sure all notices of such meetings are sent. The Secretary shall have custody of the Official Seal of the Society. The Secretary is the only Officer who has permission to use the Official Seal of the Society. In the absence of the Secretary, the Board shall appoint an Officer or Director to perform such duties. The Secretary shall have charge of all correspondence, records, and the Official Seal of the Society. The Secretary shall also perform all duties assigned to this office by the Board.

6.7 Treasurer

The Treasurer shall receive all monies paid to the Society and shall be responsible for the deposit of same in a financial institution as directed by the Board. The Treasurer shall present a detailed account of receipts and disbursements to the Board whenever requested. The Treasurer shall prepare for submission to the Annual General Meeting a statement of the Society's financial position detailing the Revenues, Expenses, and Inventory of the Society; and submit an audited copy of same to the Secretary for the records of the Society. The Treasurer shall file the annual return, changes in the Officers and Directors of the Society, amendments to the Bylaws and other incorporating documents with the Corporate Registry of Alberta as required by the Bylaws, the Act, or any other applicable statute. The Treasurer shall also perform all duties assigned to this office by the Board.

6.8 Past-President

The Past-President shall be responsible for the nomination of Officers and Directors at the Annual General Meeting. The Past-President shall also perform all duties assigned to this office by the Board.

6.9 Membership Director

The Membership Director shall maintain the Register of Members, and collect the annual fees or assessments levied by the Society. All such monies shall be promptly turned over to the Treasurer for deposit. The Membership Director shall also perform all duties assigned to this office by the Board.

6.10 Editor

The Editor shall be responsible for the publication and distribution of the Society newsletter. The Editor shall also perform all duties assigned to this office by the Board.

6.11 Program Co-ordinator

The Program Co-ordinator shall be responsible for arrangement and announcement of presentations at General Meetings. The Program Co-ordinator shall also perform all duties assigned to this office by the Board.

6.12 Field Trip Co-ordinator

The Field Trip Co-ordinator shall be responsible for arrangement and announcement of field trips. The Field Trip Co-ordinator shall also perform all duties assigned to this office by the Board.

6.13 Director at Large

Any additional Directorship created by the Society shall be called the Director at Large. The Director at Large shall perform all duties assigned to this office by the Board.

Program Summary

February

Dr. Chris Jass

Royal Alberta Museum

Digging in the Dark: Caves and Ice Age Fossils in Western North America

Friday, February 18, 2011

Caves of western North America contain important fossil deposits that provide insight into biological changes that occurred during the last Ice Age. Even in areas of the continent not commonly associated with karst topography, caves play a vital role in our understanding of Ice Age faunal change. Fossiliferous cave deposits often contain large numbers of specimens and sometimes preserve rare or uncommon specimens (e.g., soft tissue, dung). They also provide an important perspective on montane faunas, which are often otherwise unrepresented in the fossil record. Along with the many scientific benefits of working in caves come logistical challenges that are often not part of traditional palaeontological fieldwork.

Dr. Chris Jass took us on a tour of several Ice Age cave deposits in western North America, and discussed research projects associated with sites in Ari-

zona, Nevada, and Alberta. He also discussed some of the unique challenges encountered while conducting fieldwork in caves, particularly since moving to Alberta. We learned how caves contribute uniquely to our understanding of the Ice Age fossil record!

Biography

Chris Jass is the Curator of Quaternary Palaeontology at the Royal Alberta Museum, a position he has held since July 2008. He received his Master's degree in Quaternary Studies from Northern Arizona University, and his Ph.D. in Geological Sciences from the University of Texas at Austin. His primary research interests are in mammalian bio-chronology, palaeoecology, and biogeography. □



Dr. Jass at work.

Manitoba Palaeontology Symposium set for early September

The symposium will be held at the Canadian Fossil Discovery Centre in Morden, Manitoba, September 10 & 11, 2011. Deadline for submission of papers and abstracts is mid-June. For information, visit www.discoverfossils.com/research/mbpalaeontologysymposium.html □

Tumbler Ridge hosts 9th BC Paleontological Alliance Symposium

This year's event is being amalgamated with the Third Annual Peace Region Paleontology Symposium, and will run the long weekend of May 20 to 23, 2011 at the Tumbler Ridge Conference Centre. Activities include guest speakers, workshops and field trips. The deadline for abstract submissions will have passed by time you read this, but the registration deadline for attendance is May 9, 2011. There is a \$5.00 registration fee. For information, visit www.trmf.ca/bcpas.html □

Celebrity Dino Ball July 23 in Grande Prairie

By Phil Bell

The Pipestone Creek Dinosaur Initiative in Grande Prairie is ramping up developments in Alberta's northwest. The Initiative is in charge of designing and building Canada's newest and innovative dinosaur museum by the town of Wembley, 20 km west of Grande Prairie. Spurred by the discovery of a new ceratopsian, *Pachyrhinosaurus lakustai*, the museum will explore the palaeontology and geology of the Peace Region, and showcase new Albertan species never exhibited to the public. Designed by Toronto-based Teeple

Architects, the three storey space will combine a unique hands-on education approach with an active research facility destined to become a major attraction for tourists, students, and scholars alike.

To help raise the last \$5.5 million remaining on the local portion of the museum budget, the Pipestone Creek Dinosaur Initiative is organizing the most spectacular fund-raising event ever seen in Northern Alberta. Hosted by Canadian actor **Dan Aykroyd** and his wife, **Donna Dixon-Aykroyd**, the region will come together on the 23rd of July for the first Dan Aykroyd Family and Friends Celebrity Dinner. Palaeontologists **Philip Currie** and **Eva Koppelhus** will join the 700 attendees to sit alongside the likes of **Catherine Zeta-Jones** (actress), **Bobby and Mary Kennedy** (philanthropists), **Michael and Dianne Budman** (Roots Canada, owners), and **Michael and Susan Hess** (Hess Oil) for an event sure to raise awareness of Albertan palaeontology to new levels.

Inspired by the wonderful success of the Dinosaur Research Institute (Calgary), the evening will feature a silent auction of one-of-a-kind items (many of which will be supplied by the invited celebrities), a superb five-course meal prepared by the region's top five chefs, and entertainment by **The Canadian Tenors**. Sponsorship opportunities that include a table of ten are available at \$5,000, \$10,000, \$25,000 or more, and seats are available at non-sponsored tables for \$250.

If you would like to join us on this very special occasion, make a contribution, or just to make an inquiry, please call **Brian Brake at (780) 532 2362**. □



Artist's conception of the proposed Pipestone Creek dinosaur museum.

2011 Field Trips

By Wayne Braunberger,
Interim Field Trip Coordinator

Planning is well underway for this year's trips. For more information please contact me at (403) 278-5154 or by email at president@albertapaleo.org. The field trip registration form is included with this issue of the *Bulletin* and is available for downloading on the APS website (www.albertapaleo.org). Information will also be available at the monthly meetings.

Please note that all fees are due at the time of registration. Fees for trips are \$10.00. This is to cover increased costs as all guides will be reproduced in colour. Unfortunately, since the guidebooks are produced in small numbers, volume printing discounts are not available.

Non-members and unaccompanied minors will not be allowed to attend field trips. **All participants are required to have their membership in good standing. Any membership applications received after May 1, 2011 will not be reviewed and voted on by the Board of Directors until September, 2011. Therefore, if you are a non-member and would like to join be sure your application is received prior to May 1, 2011.** All participants will be required to read and sign a release form (waiver). Detailed information will be provided to all those registered shortly after the registration deadline. **After the registration deadline no refunds will be given; however, you will receive the guide for the trip. No late registrations will be accepted.** Registrations are accepted on a first-come-first-served basis. Sign up early to avoid disappointment.

For the 2011 field trips I will be sending you the waiver and medical forms to you along with the trip information. This information will be sent to you via e-mail or Canada Post. Please ensure that your addresses are correct and legible when sending in registration forms. When you arrive at the meeting place please have the forms completed. **All participants are required to have fully completed all waiver and medical forms in order to attend the trip. There will be no exceptions.** All personal information is held in confidence and ultimately destroyed.

Trip Participant Responsibilities

It is understood that risk is inherent to some degree in outdoor activities. Before registering for a trip

please ensure you understand the risks involved and are prepared to accept them.

- As a participant you are responsible for your own safety and equipment at all times.
- Inform the trip leader of any medical conditions they should be aware of in an emergency.
- Ensure that your previous experience, ability and fitness level are adequate for the trip.

Trip 2011-1, June 27 & 28, 2011 Southern Alberta Badlands

A two day trip to southern Alberta to examine outcrops of the Foremost and Dinosaur Park formations on the Pinhorn and Sage Creek grazing reserves will be held on June 27 and 28. Sites on the Sage Creek reserve were last visited by the Society in 2006. The nature of the terrain and access restrictions will limit the types and number of vehicles that will be allowed on the reserve. Also, there may be limitations on the number of participants. At this time access is pending and the exact nature of any restrictions is not known.

The field areas are located approximately one hour's drive south of Medicine Hat. Accommodations and supplies are available in Medicine Hat and the Cypress Hills. Driving to Medicine Hat from Calgary will take about three hours.

The registration deadline is June 10, 2011.

Trip 2011-2, July 15 – 17, 2011 Swan Hills area, Alberta

This is a three day exploratory trip (including travel time) to the Swan Hills northwest of Edmonton. Reports from the 1960s indicated the presence of both vertebrate and invertebrate fossils from rocks straddling the Cretaceous-Tertiary boundary in the Swan Hills area. These early discoveries were made when the massive Swan Hills oil pool was being developed in the subsurface. Drilling sites, roads and oil pipelines were the source of exposures from which the fossils were located. Decades of inactivity have seen vegetation reclaim many of these earlier localities. However today there is a resurgence of drilling in the Swan Hills and we hope to evaluate new sites in this highly underexplored and isolated region of Alberta.

This is a purely exploratory trip so be prepared not to find anything but keep in mind this is also "virgin" territory.

(Continues on Page 27)

Remember Me:

Captain Gordon Clifford Walker, CD

(1923–1970)

Pilot of the first helicopter lift
of an Albertan dinosaur skeleton



By Darren H. Tanke* and R.W. (Bill) Walker**

Historical events often have an innocuous start and are not fully appreciated or recognized as such until much later. Such is the case for Captain Gordon Clifford Walker of the Canadian Army. He was, and possibly without his knowledge, the first helicopter pilot to ever lift a plaster jacketed dinosaur skeleton out of the Alberta badlands and—as it turns out—the world. Helicopter lifts of dinosaurs and other major fossil specimens in the field are commonplace today, but Walker was in charge of, and piloted the helicopter in the very first one. Here we examine and illustrate helicopter developmental history, their early use for various Earth science fieldwork activities in western and Arctic Canada, and Walker's interesting life story. As well, we detail and illustrate the pioneering 1967 airlift. Many other helicopter lifts of mostly dinosaur fossils occurred subsequently in western Canada and continue to the present day. These will be reviewed by the senior author elsewhere (Tanke, in prep.).

Introduction

While many aspects of Albertan dinosaur collecting

and fieldwork have changed little in over 100 years, some major technological advances have made fieldwork easier. Motor vehicles¹ have replaced horses², allowing greater mobility, increased hauling capabilities, and providing quicker access to and from sites for supply runs and general logistics. Walkie-talkies and cell phones allow rapid communication between far-flung field workers. Portable electronic devices such as smart phones with Internet access, and with downloaded air photographs or software such as Google Earth™ make field orientation a snap. Gas or electric-powered jackhammers have eased the overburden destruction, but the resultant prybar and shoveling work is still hard and labour intensive. Fast-drying cyanoacrylate glues and hospital-grade “Gypsona” plaster bandages vastly speed up glue and plaster curing times.

Long ago, smaller field jackets were carried out by hand or on stretcher-type arrangements and heavier ones dragged out on a horse-drawn stoneboat (a low wooden sled) or wagon up to prairie level. In some cases they were taken down to the Red Deer River and floated out by rowboat or large scow. Helicopters existed during the “Great Dinosaur Rush” in

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Alberta around World War I, and early collectors of dinosaurs in the province no doubt knew of their existence. However, those machines were of such crude and primitive design that they could barely get themselves and the pilot off the ground let alone fly and manoeuvre to a remote field locality and then lift a heavy object. Today, removal of heavy plaster of Paris field jackets and other fossils in remote places is routinely and quickly done by helicopter, something the early field crews could only have dreamed of.

There are a few myths about who first used a helicopter on a palaeontological dig or expedition. The first, and most common, involves the American Museum of Natural History (AMNH). Barnum Brown (1873–1963) of that institution appears to have been the first to recognize the usefulness of aircraft and used them in support of remote fieldwork activities related to mapping and prospecting³. Dingus and Norell (2010, p. 246) note Brown expressing his desire to have a “helicopter plane” (no doubt an autogyro—see below and Fig. 2) in support of his 1931 expedition.

An autogyro was a component of the Ford National Reliability Air Tour (Anonymous, 2011c; Forden, 2002), a popular travelling public aircraft exhibition held across the United States from 1925 to 1931. During its final years an autogyro was added to the tour and it is possible that Brown saw one then and realized its potential for fieldwork. Milner (2009, p. 57) states that in 1958 Brown used a helicopter to look for small dinosaur skeletons exposed on vertical sea cliffs on the Isle of Wight, though this appears to be a corruption of Oliver and Sisson (1963, p. 242) who note that shortly before his death a very aged Brown expressed an interest in doing such work someday (this is also mentioned in Berger, 1958); but he never actually accomplished this. In August of 1962, just six months before his death, Brown still pursued this dream (Lewis, 1964).

Perhaps people are confused by the helicopter/AMNH association with Sinclair Oil’s “Dinoland” exhibit at the 1964–1965 World’s Fair in New York City. Barnum Brown worked as a consultant on the project but died before its completion. Most of the life-size dinosaurs were shipped by barge from their place of construction to the fair grounds. One of the dinosaurs, a *Triceratops*, was to be airlifted to the fair by a Sikorsky S-55 helicopter (Comstock, 1963), though at press time, the author was unable to confirm that this lift actually happened. Perhaps this planned or actual event is the source of the confusion.

In a second myth, some people in the palaeontology community erroneously believe that AMNH palaeontologist Edwin H. Colbert was the first to use helicopters for fieldwork when he was in Antarctica, but that occurred later—in 1969, in response to the first tetrapod fossil found there in December 1967 (Barrett et al., 1968)—that specimen was possibly found during a helicopter trip to a remote locality.

A third myth wrongly gives credit to Dale A. Russell of the National Museum of Canada (now the Canadian Museum of Nature, Ottawa) as being the first to use helicopters in the field. In 1965 he was involved in a five-week expedition in the high Arctic looking for Late Cretaceous vertebrate fossils (Russell, 1967). So how did they get there? Russell (1967, p. 21) states that they were dropped off by a DeHavilland DH-3 Otter aircraft (“Otter floatplane” in Shearman, 1965) and then picked up at the end of the expedition by an unspecified floatplane. On a side project, also in the high Arctic, Shearman used a tracked vehicle to access his collecting locality (Shearman, 1965).

There was a recent suggestion to the authors that a Russian expedition may have collected dinosaur tracks with helicopter assistance on Novaya Zemlya Island. At press time, the authors were unable to confirm the veracity of this lead.

US Navy Rear Admiral Richard E. Byrd (1888–1957) used a Kellett K-3 autogyro in Antarctica beginning in 1933 on a scientific expedition that included looking for fossil evidence that the continents were once joined (Anonymous, 1933b). This machine was lost in a crash in September 1934; it is presently unknown if it was directly involved in any fossil recoveries.

Anatol Heintz (1898–1975) of the Paleontological Museum, University of Oslo, Norway used a helicopter when collecting Early Devonian-aged fishes in the Svalbard Islands, Norway, in 1964 (Heintz, 1967). This is the earliest use of a helicopter on a palaeontological expedition that the author has found in an ongoing literature search. The authors would be interested in learning more about this or any other early fossil collecting expeditions that used helicopters.

Early helicopter development

Helicopters are commonly used in palaeontological fieldwork today (Tanke, 2009; in prep.), so it seems prudent to briefly explore their technological development here.

The concept of vertical flight (*i.e.* helicopters) was first written about by the Chinese and by 400 BC

they had developed helicopter-like toys consisting of bird feathers correctly angled and affixed to the end of a stick which was twirled between the hands, then flung upward and released for “flight” (Leishman, 2000, 2010). A Flemish document from c. 1325 includes a drawing of a boy with what appears to be a stick-mounted toy “helicopter”. A four-bladed propeller (resembling the blades on a windmill) is launched by pulling a string wrapped around a spindle below the propeller (Gibbs-Smith, 1962). Leonardo da Vinci (1452–1519) drew a helicopter concept (a helical airscrew) on paper and had a working model around 1483. Subsequent experiments mostly by Europeans using small toy models demonstrated the possibility of vertical flight (Fay, 1979; Leishman, 2007; Chiles, 2008), but internal combustion engines powerful enough to lift a human and machine had yet to be invented. Nevertheless, experiments with progressively improved small models continued and the dream of vertical flight continued.

A few years after the Wright brothers’ first flight of their airplane at Kitty Hawk, North Carolina, in 1903, crude and largely unstable helicopters made their first manned flights (the first ones in France; Fig. 1a, b), usually while still tethered to the ground: perhaps because no one knew how to land them, or to prevent them from flying away with the hapless pilot! The Wright brothers considered developing helicopters but gave up on the idea; in mid-January, 1909, Wilbur stated:

Like all novices, we began with the helicopter (in childhood), but soon saw it had no future and dropped it. The helicopter does, with great labour only what a balloon does without labour, and is no more fitted than the balloon for rapid horizontal flight. If its engine stops, it must fall with deathly violence, for it can neither float like a balloon nor glide like an airplane. The helicopter is much easier to design than an airplane, but it is worthless when done.

Fixed-wing aviation technology made rapid advances during the decades after the Wright Brothers’ first flight, much due to the pressing needs of World War I. However, helicopter development languished far behind, with a small core of dedicated professional and amateur engineers still working on the problem. They were plagued with critical technical issues such as vibration, instability, control, insufficient power, and reliability (Gerhardt, 1924; Bennett, 1928). Controlled vertical flight was achieved by 1931 (Anonymous, 1931c). True helicopters that were fully controllable did not come into being until 1936, three years prior to World War II. During that conflict Germany had several types for active mili-

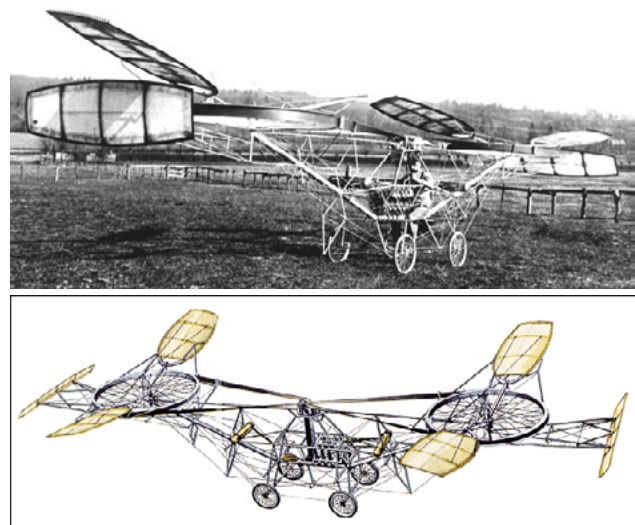


Figure 1 a) Paul Cornu (1881–1944) in his “Flying Bicycle”, the second of two French machines to lift off the ground vertically (but only ~2 metres) and hover (for only ~30 seconds) with a pilot in 1907. Image from Jackson (2005). b) A technical drawing of the machine, from Anonymous (2010b). Modern-aspect helicopters were still decades away; the first lift of a jacketed dinosaur skeleton from the field, the subject of this paper, was 60 years away.

tary use and the Americans had one (Anonymous, 1940; Powell, 1941; Anonymous, 1943, 1944, 2011a) as well as several other flying types that remained under development (Anonymous, 1945). Other combatants experimented with various types of helicopters and their hybrid variants, such as innovative autogyros (Heatley, 1985; Anonymous, 2010a).

The first autogyro flew in 1923 and one crossed the English Channel in 1928 (Wallenstein, 1928). The first flight of an autogyro in the United States was in 1929 (Anonymous, 1929).

In the summer of 1931 a Pitcairn PCA-2 autogyro (“autogiro”) marked the first appearance of one in the province of Alberta, at an air show in Calgary, where its strange appearance (Fig. 2) and aerial performance wowed a large audience (Anonymous, 1931a, d, e; Crone, 1981; Myers, 1995, p. 106–107). This travelling air show marked the first time a helicopter-like machine made its appearance in Canada. Autogyros were often the “show stealer” at these 1930s exhibitions and there was some unfounded speculation they would eventually replace airplanes (Jordanoff, 1931, among others). While they are still with us today, used mainly for recreational flying, autogyros were ultimately supplanted by true helicopter technology (Temple, 1988) which was again necessary due to the contingencies of another global conflict. Earlier versions of autogyros could not rise or descend vertically, none could hover and they

could not carry a large payload. Helicopters could do all these things with ample room for further research and experimentation, so their development was actively pursued during the war years.

In the late 1930s and early 1940s, some enterprising Canadian amateurs developed their own working helicopter designs. A unique model, with counter-rotating propellers was developed by Bernard J. Haseloh during WWII in Ponoka, Alberta, but it was ordered dismantled by the Canadian government for “public safety” reasons. Undaunted, Haseloh later developed a commercially successful line of gyroplanes. A similar helicopter project, started just prior to WWII by the Froebe brothers of Homewood, Manitoba, was cut short by the war.

The first helicopters for commercial use followed on the heels of WWII and were mostly of American and Russian design. American Bell Aircraft Corporation started developing their first helicopter in 1943 and first flew it in 1945. This helicopter, the now famous and widely-recognized Bell 47 (Fig. 3), would soon have a huge impact in the aviation community both in the commercial and military sectors, despite



Figure 2. The Pitcairn-Cierva PCA-2 autogyro CF-ARO that amazed Calgarians at the Trans-Canada Air Pageant in mid-July, 1931. The pilot is probably Captain Godfrey W. Dean. Barnum Brown of the AMNH was desirous of such a machine for 1931 fieldwork as a photographic platform. Autogyros were ideal for this kind of work as they were stable and slow-moving; several news agencies used them for photographic purposes (Anonymous, 1931b). Image from the Internet.

disbelief by one author (Francis, 1944) that commercial or private helicopters would be available anytime soon. Several other Canadian or joint Canada-USA commercial helicopter projects were under development during this period, including the Szynger SG-VI-E “Grey Gull”⁴ and the Doman LZ-5, but these ventures ultimately did not succeed.

The first military helicopter in Alberta was a Sikor-

sky S-51 based in Edmonton in 1948 (Anonymous, 1948) and the first licensed commercial helicopter in the province was also in Edmonton, in June of 1950 (Anonymous, 1950c). This was a \$30,000 pontoon-equipped Bell 47 D1 used for oil exploration and only one of about four commercial helicopters in Canada at that time. Anonymous (1950d) was quite correct in the prediction that a wider use of helicopters in the province would come soon. Canadian mineral prospectors and professional Earth scientists were soon to make use of the Bell 47 and other models in support of their field work activities. Prior to this, foot or canoe surveys, and bush planes (Richards, 1949; Terpening, 2003) were used to get around.

First use of helicopters in Canada in support of the Earth sciences

Helicopters are particularly useful for transportation of personnel and heavy lifting via long line or cargo net and getting them into and out of remote places. As such, they are very handy for geological and palaeontological fieldwork applications (Anonymous, 1947). Earth science workers began using helicopters for fieldwork in Canada as early as 1946 (Callison and Retallack, 1983). That year, a mineral company leased an American-registered Bell 47 for work near Sudbury, Ontario (Anonymous, 1946; Payne, 2006). That project, looking for mineral deposits, showed that a magnetometer suspended from a helicopter accomplished in two days what would have taken 180 days by foot traverse. Canadian-registered commercial helicopters first made their appearance in western Canada in 1947, though they did not have an auspicious start: two were destroyed and one heavily damaged, out of only five in the country that year (Vardy, 2002). The Topographical Survey (Ottawa) began using helicopters in 1949 in the northern Yukon and in other remote locales for mapping purposes, using the Hiller 360 (Fig. 3; Kerr, 1957; Tuttle, 1961; Gibson-Sutherland, 1978; Callison and Retallack, 1983). Despite the fact that the first helicopters were piston-engined and underpowered and could carry surveyors only halfway up some of the larger mountains, the party chief figured they accom-

plished in one season what would have taken twenty seasons with traditional packhorse support alone. Helicopters were of great assistance in prospecting for oil and gas across western Canada and later on in the Arctic, starting about 1950 (Anonymous, 1950a, b) and have continued to be over the years (Orton, 1979) up to the present.

The Geological Survey of Canada (GSC) used several types of helicopters in the Arctic between 1952 and 1959 (Lord, 1953; Anonymous, 1954; Fortier, 1955; Roddick, 1955; Wright, 1955; Blackadar, 1956; Roots, 1956; Woakes, 1956; Geological Survey of Canada, 1959; Zaslow, 1975; Vodden, 1992; Peterson, 2010; Ryell, 2011). These helicopters were the Hiller 360 (Fig. 3), Bell 47 (Fig. 4), and the Sikorsky S-55 (Fig. 5). The machines were used to map and survey Canada's remote north, British Columbian mountain ranges and some maritime islands. It is unknown if any fossils were picked up during these early surveys.

The use of helicopters in these areas, though expensive and posing unique logistical problems (weather delaying flights; the need for large fuel caches set up in advance (Anonymous, 1953; Blackadar, 1960); repairs and regular maintenance; support aircraft and crews), ultimately were highly economical over previous slow-paced surveys or travel over long distances via canoe or pack horse. Three seasons of helicopter work in the far north resulted in so much mapping, survey and geological data that pace surveys alone would have required forty party years

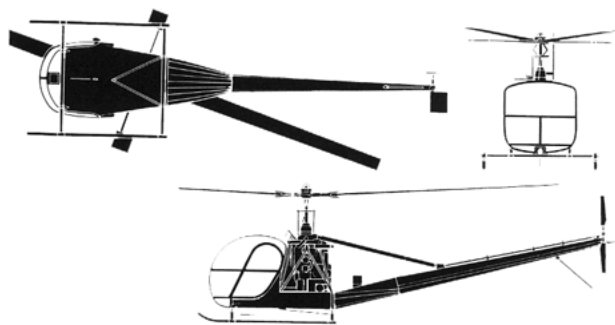


Figure 3. The Hiller 360. This spindly and frail-looking type was used by the GSC only in 1952 and although dependable, it lacked the range required for long-distance fieldwork in the northern barrens. The Bell 47 (Fig. 4) was used later. The Hiller 360 was used as early as 1949 with great success in the northern Yukon for prospecting purposes. Image from Gunston, 1981.

to equal the helicopter results (Lord, 1959).

Another comparison, showing the effectiveness of early helicopters over traditional exploration methods is again revealed, this time in exhibit signage at the Aero Space Museum in Calgary. There is a small exhibit on a Bell 47G pilot along with small geological and palaeontological specimens (invertebrates) he found or was given while guiding early oil



Figure 4. An early model Bell 47. This was the type most extensively used by the GSC in Canada during the 1950s and proved ideal for rugged fieldwork. Landing gear were either skids or pontoon floats. It may be recognizable to some readers as the Korean War medical evacuation helicopters used in the 1972–1983 hit television series *M*A*S*H**. The Bell 47 was produced from 1946 to 1974. Image from Callison, 1983.

explorers—possibly among the first fossils collected in western Canada with helicopter assistance. The signage speaks of how, in 1950, ten men supported by thirty eight pack horses, spent four months exploring the rugged foothills west of Fort Nelson, British Columbia for Gulf Oil doing surface geological surveys. After travelling some 3,200 km they found only six good sites. At the same time a helicopter was being used by another company in the same line of work. There, one man with one helicopter did the same amount of work in only one week! Helicopters are so commonplace today for a wide variety of field applications that it is now difficult to imagine a world without them.

Today, powerful turbine-engined helicopters are regularly used in support of palaeontological activities in Alberta, marking a huge technological advance over our forefathers. Since 1973, the Royal Tyrrell Museum (TMR) and its predecessor, the Paleontology Department of the Provincial Museum of Alberta (now the Royal Alberta Museum) has regularly used helicopters from the private, military (British Army and Canadian Armed Forces), and provincial government sectors. Helicopters have been used to transport heavy equipment and material to and from fossil localities, to deliver and remove person-

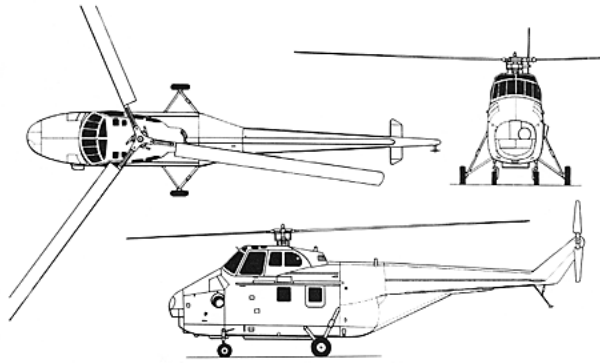


Figure 5. The Sikorsky S-55 (US military designation Sikorsky H-19 “Chickasaw”). In Canada’s far north, the portly S-55 heavy helicopter was ideal where long range and heavy carrying capacity was required. It was particularly useful for moving the larger GSC field camps and their personnel. In March 1952, the S-55 was certified as the world’s first commercial transport helicopter. A complete example of an S-55 is on outdoor display at the Aero Space Museum in Calgary. Image from the Internet.

nel from remote mountaintop ridges, for casualty evacuation⁵ and in aerial prospecting for dinosaur footprints in the mountains, but especially for the extraction of heavy, jacketed fossil specimens from remote or environmentally sensitive terrain. In 1980, the Philip J. Currie-led Paleontology Department of the Provincial Museum of Alberta (PMA; later becoming the Royal Tyrrell Museum: TMP) began to regularly use helicopters to remove dinosaur body fossils from difficult terrain in Dinosaur Provincial Park (DPP)⁶. Many PMA and TMP helicopter lifts across Alberta and British Columbia were carried out subsequently. The senior author will review those lifts elsewhere (Tanke, in prep.). The first-ever use of a helicopter to lift a jacketed dinosaur skeleton from a palaeontological dig in Alberta—and for that matter, the world—goes back to 1967. However, before we learn about that event, we will first relate the interesting career of the pilot in charge of that lift, a pioneer in the heavy twin-rotor helicopter branch of the Canadian Armed Forces. While helicopters and their pilots are numerous in our Armed Forces today, Captain Gordon Clifford Walker was one of the very first in the heavy helicopter category.

Captain Gordon Clifford Walker, RCASC

Gordon “Gord” Clifford Walker was born on February 18, 1923 in Clarenceville, Quebec, the elder of two sons in a bilingual family. His father was an English immigrant, and would soon become a member of the Montreal police force. His mother was of French Canadian and native descent. The family moved to Montreal shortly after Gordon was

born, and then from Montreal to Ottawa in 1930, as a direct result of the Great Depression and budget cuts in Montreal.

In Ottawa Gordon attended Lady Evelyn School. He joined the Canadian Militia in 1938, with the rank of “Boy,” but had to wait until after his seventeenth birthday before joining the Regular Army. He entered as a Private on August 28, 1940, and was sent overseas to Great Britain in June 1941 with the 1st Canadian Tank Brigade. There he trained as a motorcycle dispatch rider, and was promoted to Sergeant on January 9, 1942, shortly before his twentieth birthday. He was sent to Sicily with the 1st Canadian Tank Brigade in June 1943, and served both there and on the Italian mainland. In August 1944 he was transferred to the 1st Canadian Division, then in Normandy, France. He served with this unit as a dispatch rider in France and Holland, and was training as a munitions examiner when the war ended in Europe. Walker served briefly in Germany after the war before returning to Canada. He received a Mention In Dispatches “in recognition of gallant and distinguished services in North West Europe,” in a citation dated November 8, 1945⁷.

Walker left the military in May 1946, shortly after returning home. In March 1947 the Canadian military acquired several Sikorsky s-51 helicopters (Vardy, 2002), though helicopters were undoubtedly far from Walker’s mind at this point. Military service and the war profoundly changed many young men in many ways and large numbers of them had difficulties readjusting to a regular life once the war was over. Unhappy with life as a civilian, Walker rejoined the Canadian Army in August 1948, serving as a Sergeant in the Royal Canadian Army Service Corps (RCASC)⁸.

The expansion of the Canadian Army aviation branch in the early 1950s provided an exciting and challenging new career path, and Gordon started flight training at the Brandon Flying Club in July 1952, then trained as a fixed-wing pilot at the Light Aircraft School at Rivers Camp, Manitoba, starting in October 1952. He was commissioned as a Second Lieutenant on November 4, 1952, and received his Army Flying Badge (the Army equivalent of “wings”) on February 18, 1953 (Fig. 6). He immediately began training as an instructor pilot, and began duties as an instructor at the Light Aircraft School in August 1953.

Helicopters in the Canadian military were at first the responsibility of the Navy and Air Force branches. Naval officers were first sent to the United States for helicopter instruction in 1944 (Payne, 2006). On



Figure 6. Gordon C. Walker (standing, second from left); Peter Davis (kneeling, far left); instructors and classmates at Light Aircraft School, Rivers Camp, Manitoba, February 18, 1953. The training aircraft is an Auster AOP6, S/N 11672. In 14.5 years, Walker and Davis will be involved in the world's first dinosaur skeleton airlift at Dry Island Buffalo Jump Provincial Park, Alberta. Photograph courtesy of the Department of National Defense and Bill Walker.

April 5, 1947, the Royal Canadian Air Force (RCAF) acquired 7 Sikorsky H-5s ("s-51" USA designation) to train and familiarize military personnel from all three branches (Fuller et al., 1983). Over the years Bell HTL-4s (Bell 47); Sikorsky HO-4s (= civilian "Sikorsky s-55") and Sikorsky HSS-2 "Sea King" helicopters were acquired, but none went to the Army at this stage.

In the early 1950s the RSASC was tasked with providing aviation training for the Army, and most Army flight instructors in the 1950s were from that organization. Their mission was soon expanded to include helicopter transport, as the Canadian Army watched those technological developments in the US Army with much interest. Lieutenant Walker was selected as one of a small number of Service Corps pilots to form the cadre of the Canadian Army transport helicopter force, and began

helicopter training in April 1954. By December 1954 he was an instructor pilot with the Helicopter Conversion Flight of the Light Aircraft School. As one of the first Canadian Army helicopter pilots, Lt. Walker was sent to the US Army's 45th Transportation Battalion (Helicopter), at Fort Sill, Oklahoma, for further training on larger helicopters from October to December 1955. In June 1956 he was posted to the Evaluation Planning Group at Army Headquarters in Ottawa, where he would spend the next seven months evaluating various fixed wing aircraft and helicop-

ters for the Canadian Army, often operating them on field exercises across Canada.

Lieutenant Walker returned to Fort Sill in January 1957 and trained as an instructor pilot on heavy helicopters (Fig. 7). He qualified in March 1957 and served as the Operations Officer of the 91st Transportation Company (Helicopter) until May 1959.



Figure 7. The two Canadian soldiers in the middle row (Walker on the right) are easily differentiated from their American counterparts (pilots of the 45th Transportation Battalion (Helicopter)) by their uniforms lacking brass buttons. The shorter Canadian is then Captain Harry Reid, who would later be Walker's commanding officer in the No. 1 Transport Helicopter Platoon. The helicopter is a US Army Sikorsky H-64 "Choctaw" at Fort Sill, OK, c. 1958-1959. US Army photograph from collection of Bill Walker.



Figure 8. Graduation photo from the Army Aviation Tactical Training School, 1961. The instructors are seated in front, including Captain Walker on the far right. The black hat bands are worn by officers of the RCASC, the lighter hat bands are from the Armoured Corps or the Artillery Corps, the principal users of operational Army aircraft at the time. The aircraft is a Cessna L-19, which was used for the Canadian Army's artillery spotting from 1954–c.1970. Department of National Defense Photograph from collection of Bill Walker.

He was then posted to No. 2 Transport Company, RCASC, at Camp Borden, Ontario. Here he split his time between administrative duties and piloting the one Army aircraft then based at Camp Borden, on transportation and training duties across eastern Canada. He also spent time in Port Said, Egypt during this period, as part of the UN peacekeeping force following the Suez Crisis. In January 1961 Walker returned to the Light Aircraft School, for training in advanced tactical flying. He then became one of the first instructors of advanced operational flying at the newly formed Army Aviation Tactical Training School at Rivers Camp, Manitoba and was promoted to Captain (Fig. 8).

The Canadian Army had finally received its first helicopters, the Hiller CH-112 (= civilian Hiller 360; Fig. 3) in 1961 and then began a selection process for heavy transport helicopters. Key Army pilots continued specialized training while they waited for the government approval of the purchase of the larger machines. In 1962 Captain Walker received training as a twin engine instructor pilot at No. 1 Advanced Flying School of the RCAF. After this training, Walker regularly flew borrowed RCAF transport aircraft, car-

rying very senior Canadian Army officers and high ranking Army officers from several NATO countries across western Canada. Fellow RCASC pilot Bill Binney later recorded the RCAF reaction to all this⁹:

“The RCAF big wigs were keeping a watchful eye on army aviation to ensure that the grunts did not intrude into their operational turf. I recall there was some fuss when someone learned that pioneer RCASC pilot Gordie Walker had somehow wound up being the pilot of an RCAF DC 3 and brought the aircraft into Winnipeg.”

Other specialized training received during this time included visits to engine and airframe manufacturers across the US, and a brief time with US Marine Corps Squadron HMM 265 at New River, North Carolina, then operating the CH-46 Sea Knight helicopter. A popular military aviation magazine of the time recorded in the summer of 1963 that the “Vertol 107” (= CH-46 Sea Knight) helicopter had been selected for the Canadian military (Anonymous, 1963b); they entered RCAF service on October 11, 1963 (Fuller et al., 1983, p. 297). On January 4, 1964 the RCASC formed its first helicopter transport unit, No. 1 Transport Helicopter Platoon, at Rivers Camp,

Manitoba and Captain Walker was one of the first two officers assigned¹⁰. The first Vertol CH-113 Labrador transport helicopters (the Canadian version of the CH-46 Sea Knight) arrived at Rivers in November 1964 and training began immediately. On December 14, Captain Walker flew one of the first civilian assistance missions of the new Platoon, locating and rescuing a lost civilian north of Dauphin, Manitoba. The first full-scale field training with the new helicopter was conducted in the summer of 1965 (Anonymous, 1965b).

Intensive training continued from Rivers Camp at the Basic Helicopter Training Unit which became a Canadian Armed Forces integrated unit on October 23, 1965 for helicopter pilots of all branches of the Canadian military (Fuller et al., 1983, p. 301). Additional training was conducted by Walker at Army facilities across Canada. Captain Walker's log book from this time records operations at Camp Shilo, Camp Wainwright, Camp Gagetown, Trenton, Ottawa and Winnipeg, and several flights into the US. Civilian assistance flights from his log book include a medical evacuation mercy flight from Roblin, Manitoba in May 1965, tracking geese migrations with government scientists on board in April 1966, and Red River flood relief operations in May 1966. Trial flights with the extended long line, which would later be used to lift the dinosaur skeleton in 1967, were first flown by Walker in October 1965.

Captain Walker became the Operations Officer of the Edmonton detachment of the Platoon in the summer of 1966, when the Platoon was split into a main detachment at St. Hubert, Quebec (near Montreal) and a smaller detachment at RCAF Station Namao (now CFB (Canadian Forces Base) Edmonton). Training exercises with Army units and civilian support operations continued. In June 1966 Captain Walker flew one of the Edmonton helicopters to Portage la Prairie, Manitoba to lift a retired RCAF jet trainer onto a pedestal in a park. In July 1966 Captain Walker flew several operations in support of a local police search for a missing person. In April 1967 he commanded a detachment of two helicopters to Claresholm, Alberta, where several days were spent flying rescue and supply missions after a severe spring blizzard (Anonymous, 1967 f, g).

The University of Alberta 1967 field season and the first dinosaur helicopter lift

In 1967, the University of Alberta's vertebrate palaeontology department, headed by Dr. Richard C. Fox (1933–) carried out a number of field activities in

the Dry Island Buffalo Jump Provincial Park area in central Alberta (Fig. 9), their fourth summer's work in the region. One priority was a continuation of a joint project with the University of Kansas (Lawrence, Kansas) on latest Cretaceous Scollard Formation mammal-bearing microvertebrate fossil sites found in 1963 on the east side of the river and worked beginning in 1964 (Clemens, 1965; Clemens and Russell, 1965, and others). Fossiliferous matrix from these sites was bulk excavated with pickaxes and

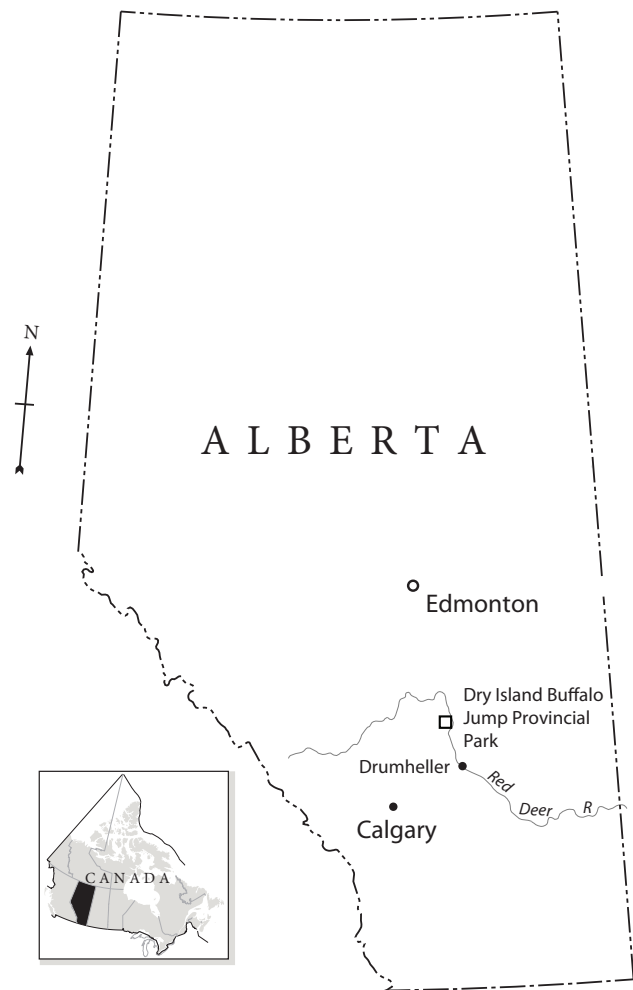


Figure 9. Map of Alberta, Canada showing places mentioned in the text. Modified from Natural Resources Canada base map.

bagged in burlap sacks. The bags were then taken to the nearby Red Deer River and their contents put into screen-bottomed wooden boxes. The boxes were anchored in shallow water along the river's edge and the fossiliferous sediments soaked for several days. Loose, unwanted sand and silt fell through the bottom of the "wash boxes" and were swept away by the current, leaving the fossil concentrate behind. This concentrate was then dried and would be carefully



Figure 10. Dr. Richard C. Fox (top) and unidentified field assistant with the completed and propped-up field jacket containing the torso of ornithomimid UALVP 16182. Image courtesy of Philip J. Currie (via Alan Lindoe, formerly of the University of Alberta, Edmonton).

sorted under a microscope later on (Clemens, 1965). These sites are the famous KUA 1 and KUA 2 mammal fossil localities.

Another project involved a UA Masters student collecting excellent amiid fish specimens from the mass mortality layers (O'Brien, 1969; Grande and Bemis, 1998) located on the west side of the Park.

A major dinosaur discovery in the region, on the west side of the river, was also excavated during July and August. This was an adult ornithomimid or “ostrich dinosaur” skeleton (Figs. 10, 11a, b) found near the base of a steep outcrop by the late Bob Graham of Stettler, Alberta in 1966 (T. Schowalter, pers. comm.).

Part of the ornithomimid’s tail was found protruding from the outcrop (Anonymous, 1967b, e). Subsequent work at the site exposed a good, nearly complete and articulated skeleton (UALVP 16182; Fig. 11b), though the skull seemed to be missing, likely lost before the carcass was buried and fossilized.

Recovery of this specimen was historically significant as it marked the first good articulated/associated dinosaur skeleton to be collected in the province since 1954, thus ending the longest dry spell of dinosaur skeleton collection since Lawrence Lambe of the Geological Survey of Canada first began working in DPP in 1897¹¹. The specimen was only slightly curled up into the classic “death pose” seen in many theropod (and other) dinosaur skeletons large and small (Fig. 11b; Faux and Padian, 2007), so it was easy to partition the tail and neck into two smaller manageable plaster blocks for manual extraction. The rest of the animal was all contained in a big plaster jacket or block measuring roughly 2 × 2 metres and 45 to 60 cm thick. It was heavy, weighing about 816 kg (1,800 pounds). Once construction of the plaster

block was completed, it was tipped over and propped up into a vertical position. It was held in place with a small hydraulic jack and lengths of strong timbers, and later supported by some wooden frames situated at each end of the block.

The quarry was located near the bottom of a deep gorge, about halfway between prairie and river level. While the nearby terrain was generally good for conventional extraction purposes, it was quite a distance laterally from both river and prairie level¹². Palaeontological fieldworkers of old would likely have used work horses and a stoneboat, dragging the block up to the prairie to be loaded on a horse-drawn wagon, or taking it down to the river by horse and stoneboat, loading it onto a boat, then floating it downriver to the first good road access. However, these modes

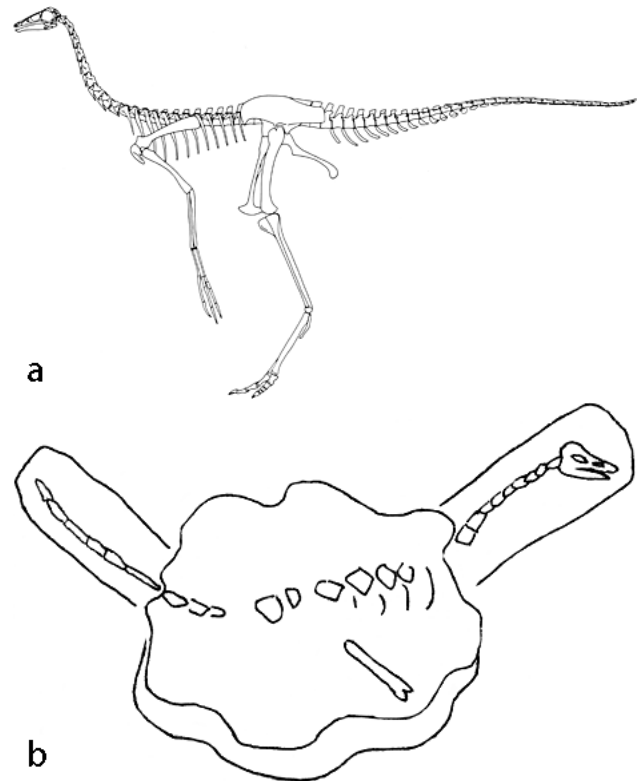


Figure 11. a) A representative ornithomimid dinosaur, *Dromiceiomimus*; an adult would reach a length of about 4 m (13.5 ft); b) quarry sketch map of UALVP 16182 ornithomimid, showing the three plaster jacket divisions. The largest block was the one airlifted. The skull sketched in Fig. 11b was wishful thinking; this area of the block was found to contain only some cervical vertebrae. Parts of the skull were later found elsewhere in the jacket. Figure 11b courtesy of Jane Danis (modified slightly). Figure 11a after Russell (1972).

of transportation were not really feasible. Finding trained horses locally for this kind of work would have been fairly easy in the early 20th Century, but not in 1967. Moving this heavy block by boat would have been awkward if not downright dangerous for

the specimen and crew. The field scenario presented a perfect opportunity for a helicopter lift, though this had never been tried before. A friend of one of Fox's summer field assistants had military connections and contacted the Canadian Armed Forces to see if they could provide helicopter assistance to get the specimen safely out of the badlands (Fox, pers. comm., 2011). They could.

The Canadian military regarded the University of Alberta's unique request as a good training exercise and public relations opportunity. The helicopter they provided was no ordinary single rotor job, but a large twin rotor CH-113A Voyageur (Fig. 12), a fairly recent addition to the Canadian Armed Forces aerial fleet. These were purchased in 1963 at about \$1,000,000 apiece (Anonymous, 2006). The dinosaur extraction mission, while palaeontological, was actually considered by the military to be a unique training exercise. As mentioned earlier, over the years the squadron used a variety of non-military scenarios to help out various public sectors, such as looking for escaped prisoners and fugitives (Anonymous, 1950e, 1970), searching for lost individuals (Anonymous, 1972b), evidence of the missing 1845 Franklin expedition in the Arctic, public relations, flood or food relief for people and cattle stranded by winter storms or avalanches (Anonymous, 1965a; 1967c, e-h; Thomas, 1967; Anonymous, 1968e), and assisting in a wide variety of scientific and public functions (Rowbottom and RodenBush, 1971) as well as VIP transport (Anonymous, 1972a; McNulty, 2008)¹³.

These atypical missions in support of civilian activities came with unique logistical and technical challenges. These sharpened the aircrews' skills and

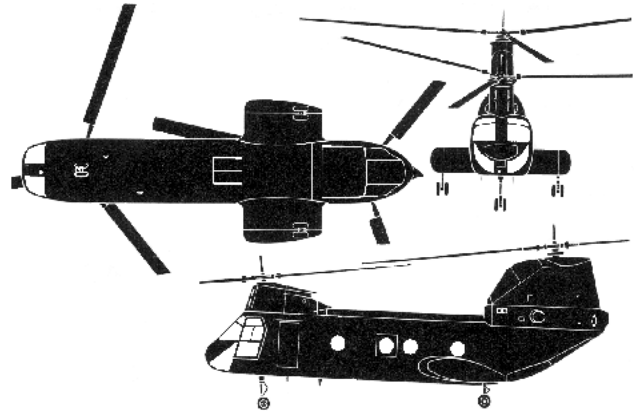


Figure 12. The United States Boeing-Vertol CH-46 Sea Knight. The Canadian CH-113A Voyageur used in the 1967 ornithomimid lift is essentially the same. First flown in 1958, the machine was developed as a US Marine Corps assault transport. After 41 years of service, Canada retired her last CH-113A in 2004. Image from Gunston, 1981.

helped them adapt quickly to unusual or unexpected circumstances and conditions (Avery, 1968). From the military standpoint, the heavy helicopter group was intended to be very mobile and available on short notice, as is often the case in wartime situations. In fact, the UA field crew had only 24 hours notice that the lift would even occur. The helicopter crew consisted of Captain Gordon C. Walker (pilot, Figs. 6–8); Captain Peter Davis¹⁴ (co-pilot; Fig. 6) and flight engineer Staff Sergeant Frederick “Rocky” Nash (Anonymous, 1968a; Fig. 14).

The ornithomimid block was airlifted on September 19, 1967. Prior to the lift the crew landed on prairie level on the north side of the Park and got a basic orientation as to field conditions and the quarry's location. The UA crew and a number of local visitors then hurried down to the site. The helicopter took off then flew out over the badlands, landing close to the

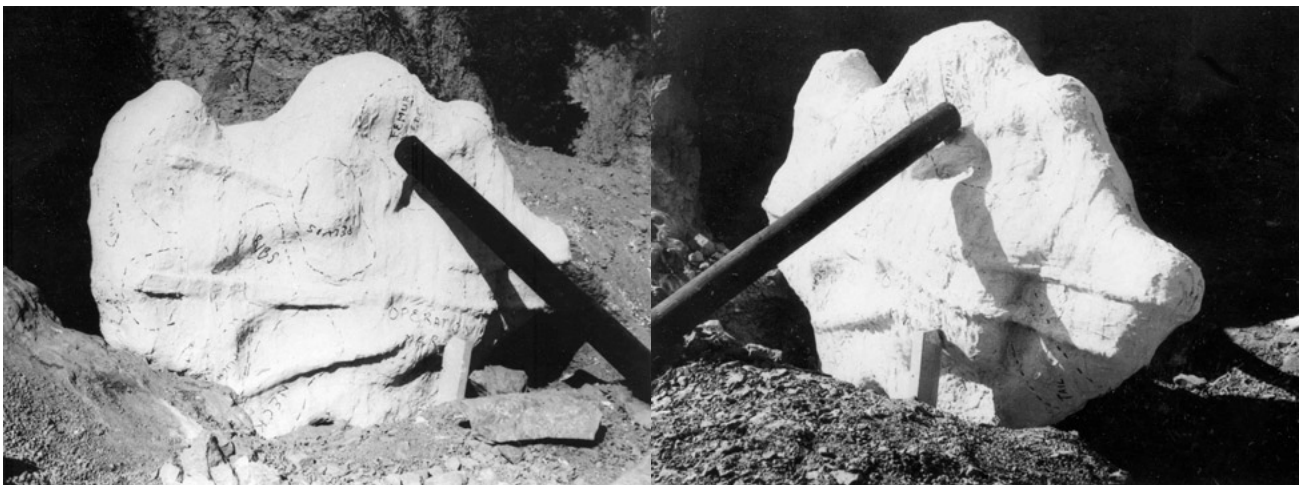


Figure 13. Two views of the plaster jacket containing ornithomimid UALVP 16182. Photographs courtesy of Jane Danis and Department of National Defense.

site on a flat to the west of the quarry; the crewmen walked a short distance down to the site to make an assessment. There they received some souvenir dinosaur bone scraps, with which they were mighty pleased. The completed jacket had previously been propped onto its edge to facilitate easier attachment of the strapping for the lift (Figs. 10, 13a, b). Strong nylon weave straps were secured to the jacket (Fig. 14); no cargo net was used as is common practice today. Any loose bits of wood and other debris that could dangerously fly around from the strong down-draft caused by the massive propellers were removed from the quarry site. The aircrew returned to the helicopter and lifted off, manoeuvring directly over the quarry.

Because the block was nestled at the base of a steep-sided outcrop, the helicopter could not lower itself right down close to the specimen, so it had to hover about 12–15 metres (40–50 feet) above the quarry, with three strong nylon straps tied together dangling from the belly. Typically the helicopter would be closer to its load

and suspend it on a shorter line, but local topography precluded this strategy. A lot of the dust created during quarrying operations was blown into the air by the massive downwash of helicopter blades. As the helicopter hovered overhead, Dr. Fox attached the end of the lifting strap to the harnessed block; then he moved safely out of the way. After a few gentle attempts at lifting, the helicopter slowly rose up and moved forward (Fig. 15), steadily gaining altitude and flying back to prairie level with the specimen dangling below; a trip of less than one minute. On prairie level the jacket was gently lowered onto the ground near a waiting UA truck. The lift line was shortened, then the block was picked up again and lowered into the truck for the two hour drive back to

the university in Edmonton.

The excitement of the lift was amply revealed in Jane Danis' (1941–) diary entry for the day. Earlier that day, she and Dr. Fox went to CFB Namao just north of Edmonton where they boarded the helicopter for the flight to and from Dry Island. Danis picks up the story from the air upon arrival:

We got to the right area and made two sweeps to go down to the rim where the people and vehicles were waiting. Boy such excitement! We came whirling in and all hell popped! Willie Lynch—wife of rancher where Richard Fox's camp is [Lynch

Ranch] — was madly taking movies! Fox and I left the copter and the crew and he stood and spoke wise words on the rim and they decided to take the bird in as close as they could get it and survey from there. "Big Bob" went in to direct them to the [plaster] cast and the rest of us roared in on foot—puff, puff! — and watched the copter come in and land on a small flat just a few hundred yards above the dinosaur. The crew scrambled down the deep slope to survey "baby" and decided "much to Fox's relief and satisfaction" that this baby would be no cinch to get—he was panicked they'd be annoyed it was too small or simple. They pondered quite a while and meanwhile, the movie camera and several stills [cameras] were busy recording it



Figure 14. Captain Davis and Staff Sargeant Frederick Nash (right) attach the straps to the ornithomimid plaster jacket while Dr. Richard C. Fox (UA) supervises the work. Photograph courtesy of Jane Danis and the Department of National Defense.

all! Ha! Such fun! The crew were so nice and of course everyone was so excited. There were several problems:

- 1) It was in a deep gulley and they really hadn't brought enough gear to rig a real deep sling.
- 2) It was nestled in beside a steep sheer cliff and they had to lift it straight up and avoid any sway which would bash the cast against the cliff and possibly break it free.
- 3) Due to the size and shape of the cast, it could not be rigged from above in the copter, it had to be rigged on the ground and then raised by rope to be connected to the cargo hook.

So the crew hauled down the rigging and wrapped the cast in straps and chain, and laid the rigging up to the shelf above the cast so it could be hooked on to the rope lowered from the chopper by the one who stayed on the ledge as the chopper moved in! Of course Fox was that one, so the rest of us scurried off up the slopes to a higher vantage point and waited.

The bird rose in a massive cloud of dust and moved in— boy! They came right in over him and lowered the rope. He had a



Figure 15. Lower left: The CH-113A moments after first lifting the block. The machine is dark olive green overall with red/white Canadian flag and roundel, and white lettering. The helicopter's shadow shows how close it was to the ground. Top and lower right: Free of the confines of the surrounding badlands, the block makes its short journey up to prairie level where it will be lowered into a waiting truck. The lower right image also appears in Anonymous, 1968d. Photographs courtesy of Philip J. Currie (top), via Alan Lindoe, formerly of the University of Alberta; and Jane Danis and the Department of National Defense (lower).

real struggle in the high wind of the two big blades, but he got it hooked up and then fell back out of the way. They lowered the copter right down into the gulley and it was frightening; we were looking from above and it seemed they were within inches of a disastrous crash—I could just see Fox and the helicopter and crew and the dinosaur all ablaze in a huge explosion. Then they got it hooked up and headed up—the cast shuddered free of its two supporting posts—everyone held their breath—and she rose straight up, just like a bird! I nearly cried! I looked down and there stood old Fox with a hero's carriage and a triumphant grin you could see for a mile! The copter came back around in front of us and it was just about overwhelming—I was awestruck. It was unreal and I'd been right there to see it all! Far too exciting for words. Willie gave me a big hug and everyone was cheering and laughing. Most everyone headed back to see it lowered into the truck waiting at the rim.

During the lift, the aircrew shared in a number of important duties. Captain Walker, the pilot, seated on the right, would finely manoeuvre the craft and keep his “eyes down,” observing the hookup work below. Captain Davis, the co-pilot, sitting on the left—and closest to the outcrops nearby—acted as the “eyes up” man, looking for any overhead or lateral obstructions. The third crewman, inside the cargo hold, would also keep an eye on any lateral obstructions and was in charge of monitoring the hookup of the field jacket. All crew were connected by intercom. Following the lift, the helicopter departed for the Calgary International Airport for refueling, then flew back to Edmonton. Airtime for the entire mission was 3.45 hours, though the actual lift, once begun, would have taken less than a few minutes to complete. It is the speed and relative ease of such lifts that make them such an attractive option for fossil specimen removal.

The helicopter lift was documented in Avery (1967), Anonymous (1967a-b, d-e), Harvey (1967), Anonymous (1968a, c-d) and Tanke (2009). Upon its arrival at the UA preparation lab, work on the fossil commenced (Anonymous, 1968b; Fox, 1968), and lasted some six months. But when it became apparent that the skull was missing, the specimen's work priority diminished and it was resealed and put back into storage (J. Danis, pers. comm., 2008) for over forty years. Not long after Philip Currie joined

the University of Alberta in late 2005, work on the specimen was reprioritized under his direction. The specimen underwent some preparation (Currie, pers. comm., 2009). Through that work it was determined that a skull actually *was* present, but in a disarticulated condition.

The helicopter used in the historic 1967 ornithomimid lift was later lost under tragic circumstances. Its original serial number, 10413, was changed to 11313 (Walker, 2008), a doubly unlucky number for those who are superstitious. After serving in the heavy transport role for a number of years, the helicopter



Figure 16a-b. The remains of Canadian Armed Forces CH-113A Voyageur helicopter #11313 after crashing in Edmonton on March 19, 1974. Both images from Hume, 1974.

became a total loss when it crashed near the Namao¹⁵ military base in Edmonton on the evening of March 19, 1974 (Anonymous, 1974a, b; Hume, 1974; Figs. 16a, b). Her crew of three, Captain Ronald Raymond Fleming CD (age 36); Captain Ronald George Davidson (age 31); and Master Corporal Malcolm Ross Caton (age 29) all perished in the crash. The loss of the aircraft is noted in Anonymous (1975) and an investigation revealed the mishap resulted from internal rotor blade spar erosion and cracking resulting in about three metres of one of the forward blades detaching in flight. This resulted in a catastrophic

mid-air breakup of the aircraft. An investigation ensued and legal proceedings began; these remained unresolved until nearly three decades after the crash.

Captain Walker (post 1967), his family history concluded, and closing comments

Following unification of the Canadian Armed Forces in February 1968, No. 1 Transport Helicopter Platoon became No. 450 (Heavy Transport) Helicopter Squadron. Captain Walker continued as the Operations Officer of the Edmonton detachment until his retirement. His last flight log book entry was dated October 2, 1969. After retirement, Captain Walker followed a long interest in aviation writing and became the editor of *Canadian Wings* magazine, then located in Calgary. Tragedy struck again when Captain Walker was killed in a car crash in Calgary on November 28, 1970.

Gord Walker was first married to Regina Barnett in Hove, England on February 28, 1942. Their daughter Victoria was born in Hove on February 19, 1943. Today Victoria lives in San Diego, California. Gord and Regina were divorced in March 1946. His second marriage was in June 1946, to Sgt. Elsie M. Eubank of the Canadian Women's Army Corps. Elsie was from Herbert, Saskatchewan, and had joined the Army in 1942. She served first as a cook and later as a clerk, mostly at Ottawa. Both left the Army shortly after they were married. Several children followed. Nora Lynne Walker was born in Kingston, Ontario on March 12, 1947, and junior author R.W. (Bill) Walker was also born in Kingston on August 18, 1952. Elsie passed away in Whitby, Ontario in June 2009. Today Nora Lynne lives in Trenton, Ontario, having recently retired from a long career of industrial nursing and human resources management. The junior author currently resides in London, Ontario, and runs an engineering consulting business.

Helicopters play an important role in a wide variety of functions in Canada today. What began as five commercial helicopters in Canada in 1947 has grown to over 1,600 today (CCAR, 2011). For over three decades they have been an important component of the Royal Tyrrell Museum's fieldwork, both in inserting and extracting field crews, their equipment and fossils, but are also vital in removing heavy field jackets from remote and/or protected badlands environments (Tanke, in prep.). Canadian military helicopters did more lifts for the University of Alberta in the years following the 1967 lift (Fox and Forey, 1973; Tanke, 2010a, b) and helicopters were then used by

other palaeontological institutions and departments worldwide; but it all started in Alberta in 1967 in a Canadian Armed Forces machine piloted by Captain Gordon Clifford Walker¹⁶. It is truly a shame that he died before he could see a new field technique he helped pioneer become a common practice today, used by palaeontological crews worldwide.

Notes on the text

1. Barnum Brown of the American Museum of Natural History was the first to use motor vehicles in the field in Alberta (1912), but this was simply tagging along with oilfield workers or town friends he had made in Alberta. Dedicated fieldwork was not done with vehicles at this time. The GSC was the first to use a car, a Ford Model T, beginning in 1921. The first use of a truck was by the Chicago Field Museum in 1922, a new Ford one-ton truck costing \$946.75. Both vehicles were first used in DPP. The car was subsequently used upriver from Drumheller, for GSC work, but the truck was sold at the end of the 1922 field season.
2. The last use of horses on a palaeontological dig for dinosaurs in Alberta was by the Royal Ontario Museum in Dinosaur Provincial Park in 1954. Early 1980s expeditions for Triassic-aged fossil fish at Wapiti Lake, B.C. used horses for transport of personnel, supplies, and specimens but they have since been replaced with helicopters.
3. There is some confusion about the plane used by Brown in 1934. Dingus and Norell (2010, p. 258) figure a "Stinson" airplane flying over "Howe Quarry," Wyoming; this is possibly a Stinson SB-1 "Detroiter." Brown (1935) calls the plane he used in 1934 a Stinson and includes several pictures of it. One plane figured in Dingus and Norell (2010) is unquestionably a small biplane and in Brown (1935) it is a larger monoplane. There is no indication of Brown using a biplane in 1934 (only the monoplane) so the Dingus and Norell (2010, fig. 37) identification may be in error unless Brown used more than one type of plane. Brown's 1935 article suggests only the monoplane was used that year. Anonymous (1935) describes Brown's plane in 1934 as having a four-passenger capacity and a 215 horsepower Lycoming engine. Only the Stinson "S" Junior model, a four-passenger monoplane matches that engine configuration (Anonymous, 2011b); and pictures of the aircraft in Brown (1935), further showing a cowled engine, match this Stinson product.

Anonymous (1933a) indicates Brown was

then using aircraft to find distant outcrops likely containing dinosaur material and then sending ground crews in to explore them on foot (Anonymous, 1941). He did these aerial surveys for about ten or more years with strong sponsorship from the Sinclair Oil Company for some of them. Brown (1935) states that in 1934, six weeks of aerial exploration achieved what would have taken twenty years on the ground. 180 hours were spent in the air and covered 32,200 km (20,000 miles). Over 900 aerial photographs were taken. The 1934 aerial expedition created much media attention (Adamson, 1934; Anonymous, 1934a-c to name a few).

In 1938, Brown apparently did a similar aerial reconnaissance of Alberta, starting at Edmonton and ranging south to the Canada-United States border (Anonymous, 1938; Dingus and Norell, 2010, p. 275), but little of the results of these efforts are currently known. Work was to begin around mid-October of that year and to take one month. Later on, word got out that Brown's aerial photography work might have been the work of a German spy and an RCMP investigation ensued! (Wayling, 1939). The senior author is currently researching this incident and will report on it in the future.

4. The original machine is on display indoors at the Canada's Aviation Hall of Fame in Wetaskiwin, Alberta. See <http://www.cahf.ca/index.php>
5. An even earlier use of a helicopter in Alberta and related to vertebrate palaeontology, involved not the removal of a fossil, but the emergency removal of a palaeontologist! During Alberta's first vertebrate palaeontology conference hosted by the University of Alberta in 1963 (Colbert, 1963; Russell, 1963; Devillers, 1964; Folinsbee and Ross, 1965), Wann Langston, Edwin Colbert, William E. Swinton (d. 1994) and others went for a long walk on the shore of the North Saskatchewan River in Edmonton to look at some outcrops. As the group returned, Swinton, out of shape, trailed far behind, then got stuck in some mud. He overexerted while trying to extricate himself, fell ill, and then passed out. Due to the remoteness and rough topography of the accident scene, Swinton was rescued and transported to hospital in a Bell 47 type helicopter (Fig. 4). He was lashed onto an external stretcher affixed to one of the helicopter's landing skids. That would have been quite a ride! Swinton was to have been the conference's keynote speaker that night but had to stay in the hospital overnight for observation. It was up to an understandably unprepared Colbert to fill in for Swinton at the last moment to deliver the address which was apparently not very successful (Langston, pers. comm., 2009).
6. An earlier lift, the first for the PMA occurred near Drumheller in 1973 (Anonymous, 1973). This was another lift done by the Canadian military.
7. A letter from the Department of National Defense to Sgt. Walker reports the date and the citation, but the junior author has not been able to locate the original citation in the London Gazette.
8. For an even more detailed history, see *The Army in the Air—Alpha to Omega*, online at <http://www.tachelmemoires.ca/memoires/Rowbottom-Rodenbush/ArmyInTheAir.pdf>
9. Quoted by former RCASC pilot Jim Grant, in his privately published history of the RCASC aviation branch, *Blackdown to the Wild Blue Yonder* (2000). Online at <http://www.tachelmemoires.ca/memoires/RCASC/BlackdownToTheWild-BlueYonder.pdf>
10. Along with the platoon commander, RCASC Major Harry Reid. Reid had served with Captain Walker at Fort Sill several years earlier.
11. Certainly Charles M. Sternberg had worked in DPP several years earlier on four dinosaur skeletons, but these were not specifically collected. They were just exposed *in situ* on one side and a cinder block building constructed atop each for public display.
12. The empty 1967 UA ornithomimid quarry is at or near UTM 12U 366769, 5757462 (NAD83), not far from the famous *Albertosaurus* bonebed worked by the AMNH in 1910, TMP in 1998–2005, and UA in 2006–2010 (Currie and Koppelhus, 2010). Scattered ornithomimid phalanges and other bone pieces are occasionally recovered from this site. Abundant wood debris left behind at the site by the 1967 crew was collected and burned by Philip J. Currie and the author around 2001 at the request of Park staff. About a pound of nails were also removed.
13. The helicopter used on the 1967 dinosaur lift was later used to transport Canadian Prime Minister Pierre Elliot Trudeau (1919–2000) on some of his official duties. Surprisingly, Trudeau was even allowed to fly the machine for short stints even though he had no training whatsoever (Anonymous, 1972a).
14. Lt. Davis had received his Aviation Badge on the same course as Lt. Walker, in February 1953.

15. All internet web pages related to helicopter history erroneously state that the machine was lost near Nanaimo, B.C. It is suggested that a simple typing error changed Namao to “Nanaimo” and various researchers have unwittingly perpetuated the error.
16. Captain Gordon Walker received numerous medals and awards during his military service: 1939–1945 Star (1945); Italy Star (1945); France and Germany Star (1945); Defense Medal (1945); Voluntary Service Medal (1945); 1939–1945 Medal with Oak Leaf [for the Mention In Dispatches] (1945); 10 Year Service Medal (1950); United Nations Emergency Force Medal (1960); and the Canadian Centennial Medal (1967).

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2011 Field Trips

(Continued from Page 7)

Accommodation, fuel and a restaurant are available in the town of Swan Hills as well as in Whitecourt, about an hour’s drive south of Swan Hills. There are plenty of campgrounds in the Swan Hills area. Members are welcome to participate for all or part of the trip. Note that Swan Hills is approximately 500 km from Calgary and the drive will take 6–7 hours. Stay tuned for more details.

The registration deadline is July 1, 2011.

Trip 2011-3, August 20 & 21, 2011 Canyon Creek-Moose Mountain, Alberta

This trip will revisit the Canyon Creek-Moose Mountain area of Kananaskis Country approximately 60 km west of Calgary. During the most recent visit in 2003, we made six stops at various formations and contacts. Geological observations were made and members had an opportunity to collect invertebrate fossils from Mississippian and Lower Jurassic rocks.

This year the trip will be expanded to two days, covering up to twenty stops, including fossil collecting and prospecting sites (please note, collecting at a couple of the sites may be restricted due to the scarcity of fossils present or the dangers involved due to falling rock or extreme conditions), geological points of interest and a possible visit to an abandoned well site. There will also be opportunities to observe and

photograph a fantastic array of wildflowers and common fauna indigenous to the area.

Some sites will be roadside stops while most others will involve a trek on level ground. Proper hiking footwear will be mandatory as steep slopes with loose rocks, muddy surfaces, and some difficult trails along dry to semi-dry creek beds are anticipated. A good walking pole and backpack will definitely be an asset. Lots of water is essential for those making longer treks. Other dangers in the area may include, but are not limited to: ticks, cougars, bears, hydrogen sulphide (H₂S) gas, bad weather, contaminated drinking water, isolation from help, difficult evacuation.

Due to the variety of terrain we will encounter, conditions will vary at each site being visited. However, those with limited physical abilities are encouraged to attend as we may only spend 10–45 minutes at each site and those wishing to hold back on the more difficult treks may do so with little sacrifice.

This trip will be limited to 20 participants and limited vehicles so participants will have to carpool into the area. We will have access behind locked gates with our vehicles. **Those who arrive late will not be permitted access beyond the locked gates once the trip has begun. Field trip times will be strictly adhered to.** Plans are to meet at the Ings Mine parking lot (Canyon Creek Road) at 8:00 A.M. on Saturday for a brief orientation prior to getting underway, and 9:00 A.M. on Sunday. There are lots of camping opportunities in the immediate area and Calgary is less than one hour away.

The registration deadline is August 5, 2011. □

Field Trip Guidelines

By Wayne Braunberger

The following guidelines have been developed so that you may prepare for the trips and so that everyone may have an enjoyable time. These guidelines are under development and changes will be made from time to time as the need arises. The Events Director, Field Trip Co-ordinator and Field Trip Leader(s) reserve the right to limit the number of participants on a field trip. Please contact me (403) 278-5154, president@albertapaleo.org if you have any questions or concerns.

1) Registration

Register early as it makes planning much easier. Remember that **field trips are only open to members of the Society**. The stated deadlines are the last day that registrations will be accepted. After this date the field guides will be printed and any final arrangements will be made. Once you are registered you will receive either by e-mail (preferred) or regular mail all pertinent information regarding meeting times and places, driving times and directions, itinerary and any other information that may be required.

2) Arrive On Time

Plan to arrive at the appropriate time. In order to complete all the paperwork and distribute the field guides in a timely manner you need to arrive before the designated departure time. If you are going to be delayed please let me know. I will provide a contact number (cellular phone) for use in the field. Most of our field trip areas have cellular coverage.

3) Medical Questionnaire

A medical questionnaire will be included in the information package that is distributed prior to the trip. Inform the field trip leader if you have any medical conditions that they should be aware of in an emergency.

4) Waivers and Informed Consent Forms

Everyone who attends a field trip will be required to complete a Waiver Form if they are over the age of 18. Parents and/or Guardians will be required to complete an Informed Consent Form for any children under the age of 18 or dependents over the age of 18. One form is required for each participant and must be witnessed by the field trip leader or designate. You will not be allowed on the trip if you do not complete the proper form. Copies will be included in the information package that you receive prior to each trip.

5) Be Prepared

Field conditions can vary. While every effort is made to scout locations and inform participants of conditions, be aware that changes can and do occur. Your vehicle should be in good working order and appropriate for the conditions. When necessary we will car pool so that everyone can get to the location. Refer to the article "Personal Safety in the Field" which follows this article for information on items that everyone should have with them.

6) Equipment

Proper equipment is a must. Sandals, "croc's," running shoes or street shoes are not appropriate footwear. It is recommended that you wear a pair of good quality hiking boots that fit well and provide adequate support for you feet and ankles. Proper rock hammers and chisels must be used. Standard carpenters claw hammers are not acceptable and are very dangerous, as they are not intended for hammering on rocks. Hammers manufactured by the Estwing company are recommended and are available at most rock and lapidary shops, geological supply stores and at many hardware stores. Safety glasses or goggles should be worn when hammering or splitting rocks.

7) No Dogs

Please do not bring your dog on field trips. Many people find dogs on trips to be annoying and the dog may become injured in an encounter with a wild animal (coyote, rattlesnake, porcupine, bear). In addition many landowners will not allow dogs on their land. Contact me prior to the trip if you need to bring your dog.

8) No Smoking in the Field

Humans are one of the leading causes of wild fires (both accidental and intentional) and in order to reduce the risk there will be a **NO SMOKING** policy on APS field trips. We would ask that you only smoke in your vehicle or at the parking lot. Many of the areas we visit are extremely dry and a fire could be devastating to the environment and/or private property.

9) No Alcohol or Drugs

Persons under the influence of alcohol or drugs are a danger to themselves, other field trip participants and the general public. We would ask that the consumption of alcoholic beverages be limited to after the day's activities. Any persons using illegal substances while on the field trip will be asked to leave immediately and their participation on future trips will be in question. □

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Personal Safety in the Field

Ten items everyone should carry

By Wayne Braunberger

Personal safety is everyone's responsibility. You should not leave it up to someone else to have the items you may need if an emergency situation arises. Whether you are a participant on an APS field trip or just out for a day hike, everyone should carry the following items at all times. Relatively minor incidents can become serious if you are not prepared.

- 1) **First-aid kit.** You should be able to take care of any minor injuries (cuts, scrapes) that occur. Everyone should take a basic first-aid course and if you are in the outdoors much of the time a wilderness first-aid course is highly recommended. Wilderness first-aid courses are geared specifically to the prevention and treatment of injuries that can occur while hiking and camping.
- 2) **Whistle.** Everyone should carry whistles, as they are one of the most effective ways to call for help or alert others. You can blow a whistle longer and louder than you can yell and the sound carries much farther. Whistles should be carried where they are accessible to your mouth, not in your pocket or pack.
- 3) **Knife.** A good pocket knife can be a handy item to carry. Multitools such as those made by Leatherman are excellent but expensive. A very inexpensive and effective knife is a "Mora" knife, available at most outdoor stores.
- 4) **Flashlight/headlamp.** Hiking in the dark can be a real pain. Also great for signalling at night.
- 5) **Waterproof matches/lighter/fire starter.** You may need to start a fire for any number of reasons (signal fire, to dry out, keep warm).
- 6) **Extra food and water.** Besides your lunch, carry extra food as you may be out later than you planned. Always carry more water than you think

you'll need. On a hot day you will drink it all. (By time you feel thirsty you're already dehydrated.) Water is also useful for washing off cuts and scrapes.

- 7) **Bad weather clothes.** Always be prepared for bad weather. You can always take clothes off but if you did not bring extra you can be in trouble very quickly.
- 8) **Toilet paper.** Besides the obvious use, it's great for wrapping specimens.
- 9) **Sunscreen, sunglasses, brimmed hat.** Direct sunlight as well as light reflected off rock surfaces can cause severe sunburns.
- 10) **Map, compass, GPS receiver.** You need to know where you are, where you've been and where you are going. Many people become lost by not knowing how to return to their vehicle. Also, you need to be able to locate any significant fossil discoveries and be able to tell others where they are or to find your way back to them. If you do not know how to read a map or use a compass or GPS receiver, take a course.

Other useful items to bring along include: one or two emergency (space) blankets to provide warmth or form part of a shelter; a small tarp to provide shelter; a ski pole or walking stick to provide extra stability when hiking, and a small foam pad to kneel on. □

Reviews

By Les Adler

Azerbaijan's Fossil Cemetery

By Said Huseynov and John M. Harris

Natural History, Dec. 2010/Jan. 2011, pages 16–21.

Said Huseynov is the press secretary at the Geology Institute of the Azerbaijan National Academy of Sciences. He provides an account of the research activities of the H. Zantabi Natural History Museum of the geology Institute.

John M. Harris is the chief curator of the Division of Earth Sciences of the Natural History Museum of Los Angeles County, U.S.A. and is head of vertebrate studies, responsible for the vast collections of

the Late Pleistocene fossils from the La Brea Tar Pits housed at the George C. Page Museum, Los Angeles.

Azerbaijan is east of Georgia and Armenia with its capital city of Baku located on the west side of the Caspian sea, approximately 1,400 km southeast of Moscow and 1,150 km southeast of Stalingrad. The Binagadi Prehistoric Tar Pit is 16 km west of the Baku airport and the Gala Asphalt Seep is 8 km southeast of the airport on the Absheron Peninsula, in the Caspian Sea.

Photographs show the seeps at Binagadi and Gals; a narrow-nosed rhinoceros skeleton, a grey-wolf skull and mandible, a duck, a cow and a selection of tar covered mammal bones recovered from the seeps.

The Binagadi seep, 9 km from downtown Baku, is a counterpart to the La Brea Tar Pits, a Los Angeles tourist attraction. The fossils at Baku date from 190,000 years ago while the La Brea deposits date from 60,000 years ago.

The Absheron Peninsula hydrocarbons reach the surface from depths 900 to 1,500 m below the surface. The locality features asphalt seeps and mud volcanoes that emit oil and gas. The Binagadi site, some 60 to 70 ha in area, bordered the shore of a historic lake, each summer trapping birds which then became vulnerable to poisoning, exposure, thirst and starvation; scavengers and predators followed. The lake hardened each season until the next summer enticed new victims. Seeps still exist.

Binagadi became a hardened knoll in time and in the sixth century, A.D., a village was built on the site. Fossil bones and plants eroded from the ground before scientific excavations started in 1938.

Absheron Natural Monument was designated in 1982. It covers 1.5 ha and is 4 m deep. Geologists and palaeontologists have collected and identified the remains of nearly 300 different species: 1 amphibian, 1 mollusc, 2 reptiles, 22 plants, 43 mammals, 108 birds and at least 120 kinds insects. Perhaps another 100 additional insect species will be identified. Many of the bird species are extinct, identified from bones and sometimes with skin and tendon. At La Brea, in contrast, many species of microbes have reduced all the fossils to their bare bones and shells.

The large mammals at Binagadi, as at La Brea, are all now extinct. Isotopic studies are used for identifying smaller mammals. Molluscs are missing at Binagadi, while at La Brea many types have been found, serving as useful indications of climate.

Several scientists have attempted to date the deposits, comparing the Binagadi assemblage with other Caucasus groups and concluding that the age

here is that of the latest interglacial period, from 130,000 to 112,000 years ago.

La Brea's fossils were placed under protection soon after 1913. It has taken until 2007 for the government of Azerbaijan to rescue and preserve Binagadi. A visitor centre will be built and a database and catalog are underway. Scientists from La Brea are joining in, as well as investigating asphaltic deposits in Venezuela and Ecuador.

Blood from Stone

By Mary H. Schweitzer

Scientific American, December 2010, pages 62–69.

After being trained as a high school science teacher, Mary reignited her interest in dinosaurs to earn a Ph.D. in biology from Montana State University in 1995. She is now an associate professor at North Carolina State University and an associate curator at the North Carolina Museum of Natural Sciences.

The conventional view of fossilization holds that over time all of the organic compounds disappear, leaving behind only inert mineralized remains. A growing body of evidence indicates that under certain conditions, organic substances such as remains of blood, bone cells and claws may persist in fossils for millions of years. These ancient substances could help answer such questions as how dinosaurs adapted to changing environmental conditions and how quickly they evolved.

In 1992 Mary noticed small red spheres in a blood vessel channel in a bone slice from a *Tyrannosaurus rex* at the museum of the Rockies in Bozeman, Montana, which had died about 67 million years ago. Jack Horner, curator of palaeontology at the museum asked her to prove that these objects were not blood cells although they had the right size, shape and colour.

Since then Mary and her colleagues have recovered various types of organic remains, including blood vessels, bone cells and bits of fingernail-like material that make up claws, from multiple specimens indicating that although soft-tissue preservation in fossils may not be common, neither is it a one-time occurrence.

Bones from another *T. rex* specimen in conjunction with other evidence has revealed that the animal was a female preparing to lay eggs when she died. A protein in another dinosaur indicates that it had feathers that at the molecular level resembled those of birds. Many scientists are skeptical. Mary states

that her studies have the potential to improve the understanding of how dinosaurs evolved and became extinct.

Extraordinary claims require extraordinary evidence: consequently every experiment possible is being tried to disprove that the materials being discovered are compounds of soft tissues from dinosaurs and other long-gone animals.

Among the animals shown in this article is a *T. rex* skeleton from eastern Montana, MOR555 (“Big Mike”), which has many rarely preserved bones with pristine preservation. Spectroscopic examinations were undertaken to show that blood compounds were there. Antibody data was also assembled.

A photo shows that a Late Cretaceous Period primitive bird, *Rahonavis*, about 70 to 80 million years old, from Madagascar, has a white fibrous material on the toe bones. Tests were done to show the existence of alpha and beta keratin proteins and that the material was the remainder of once lethal claws.

Another Late Cretaceous specimen called *Shuvuuia deserti* (“deser bird”), from Mongolia, turned out to be a dinosaur with possible impressions of feathers. Beta keratin (a protein) was found here. Later studies have included a mammoth skeleton and another *T. rex*. Several more papers have been published, adding to the controversies by sequencing material from other dinosaurs. Structures called osteocytes, from duckbilled dinosaurs, resemble those of modern birds; many other labs are doing independent tests which confirm Mary’s results.

Protein sequences from living specimens are still being assembled for comparison. It is hoped that the insights obtained will help scientists to piece together how dinosaurs and other extinct creatures responded to major environmental changes, how they recovered from catastrophic events and ultimately what did them in.

Dawn of the Deed

By John A. Long

Scientific American, January, 2011, pages 34–39.

John A. Long studies the early evolution of fishes. Currently vice-president of research and collections at the Natural History Museum of Los Angeles County, he is the author of eighteen books, including *The Rise of Fishes*.

Colour-coded cladograms on page 38 show the predominant forms of reproduction for some major vertebrate groups:

- Internal fertilization (penis, hemipenes): Mammals (human); birds (ostrich); dinosaurs (*T. rex*)
- Internal fertilization (claspers): sharks, placoderms.
- External fertilization: frogs, bony fishes, lampreys.

Long states that although internal fertilization arose in placoderms, the bony fishes that succeeded them mostly reverted back to spawning. With the evolution of tetrapods from the bony fishes, internal fertilization came back into vogue and the pelvic anatomy inherited from the placoderms (including the claspers they used for copulation) provided the foundation for tetrapod hips, legs and genitalia. In place of claspers tetrapods evolved bilobed reproductive organs called hemipenes as well as penises.

In August 2005 John Long and his team were collecting fish fossils contained in Devonian Period limestone nodules at Gogo Station, a large cattle ranch in northwestern Australia. The most abundant of the fishes from the Gogo reef were placoderms (“plated skin”), some of the first backboned animals with jaws. The group had come to Gogo to look for fish specimens that might help to resolve how placoderms were related to other backboned creatures.

The Gogo fossils are famous their extraordinary preservation in three dimensions. It was not until November 2007 that a particular specimen from 2005 was found to belong to the ptyctodontid family of placoderms. Using a scanning electron microscope a mineralized umbilical cord was identified, indicating that a 375 million-year-old expectant mother fish had been found, with the oldest vertebrate embryo on record. The name given is *Materpiscis attenboroughi*, “Attenborough’s mother fish,” in honour of the British nature presenter.

Subsequently, another specimen was found with triplet embryos inside, now called *Austroptyctodus*, recognized in a collection made twenty years earlier.

Another genus, *Incisoscutum*, an arthrodire, also contained embryos. Thus at least two of the seven main groups of placoderms reproduced by copulation at least 25 million years before the sharks and other chondrichthyans did.

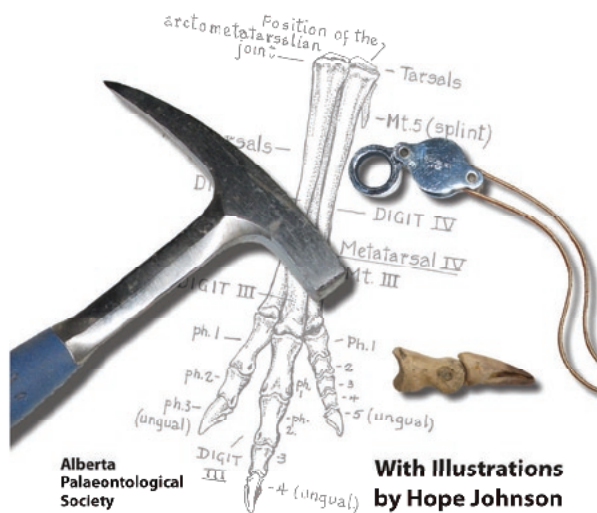
Martin J. Cohn of the University of Florida showed in 2004 that the HOXD13 gene is active in the developing limbs and genitalia of mammals, indicating development may have been derived from the early fish pelvic girdle. A lengthy discussion follows on vertebrate evolution. Many questions remain unanswered. □

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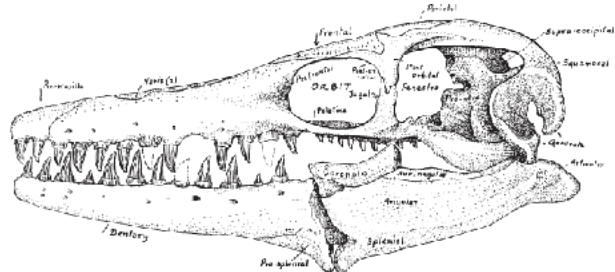
A Guide to Common Vertebrate Fossils from the Cretaceous of Alberta. Assembled by the Alberta Palaeontological Society (APS) with illustrations by naturalist Hope Johnson; Foreword by Dr. Donald Brinkman, Director of Preservation and Research, Royal Tyrrell Museum of Palaeontology.

Contents include: Geology of the Vertebrate Fossil Bearing Formations in Alberta; Collecting Regulations; Curation; Skeleton Terminology; Fishes; Amphibians; Turtles; Champsosaurs; Crocodiles; Lizards; Mosasaurs; Plesiosaurs; Tyrannosaurids; Ornithomimids; Hadrosaurs; Ceratopsians; Ankylosaurs; Pachycephalosaurs; Mammals; Index; and much more.

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