Alberta Palæontological Society Bulletin

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ALBERTA PALÆONTOLOGICAL SOCIETY

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	$15.00 annually
Family or Institution	$20.00 annually

THE BULLETIN WILL BE PUBLISHED QUARTERLY: March, June, September and December. Deadline for submitting material for publication is the 15th of the month prior to publication.

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UPCOMING APS MEETINGS

Meetings take place at **7:30** p.m., in Room **B108** (or **B101**, across the hall)
Mount Royal College: 4825 Richard Road SW, Calgary, Alberta

March 15, 2002—Keith Mychaluk, APS member: "What is Ammolite?"

April 19, 2002—Dr. Anthony Russell, University of Calgary:
"Cryptozoology, Science and Scientists: The Case For and Against *Cadborosaurus.*"

May 24, 2002—Tanya Samman, University of Calgary: "Tooth Placement in *T. rex*" (tentative)

ON THE COVER: Alberta fossils—Carbonized plant fossils in sandstone: *Sequoia dakotensis* cone(centre); *Ginkgo* sp., cf. *G. adiantoides* leaf (centre right); fragment of cycad leaf, cf. *Nilssonia* sp. (upper right). Upper Cretaceous (Maastrichtian), Horseshoe Canyon Formation. Magnified approximately 2.5 times. Specimen courtesy of Dan Quinsey, photo by Howard Allen. Have you got a rare, unusual, or spectacular Alberta fossil we can showcase on a future cover? Please contact the Editor!

Society Awards Life, Honorary Memberships

by Wayne Braunberger

Les Adler
Life Membership

Les Adler, one of the founding members of the Alberta Palaeontological Society, was honoured with Life Membership at the January 2002 Symposium. Les was an active member of the "Fossil Group" (the precursor of our Society) which held informal meetings and field trips. When the Alberta Palaeontological Society was officially formed in 1986 Les took on the role of chairing the nominating committee. Over the years Les has served on the executive in a number of capacities: Treasurer, 1987–1992 and 1999; President, 1992–1995; and Past-President, 1995–1999. Les is also a steady contributor to the *Bulletin* and has given talks, led field trips, and contributed to the Society's collection.

For over 50 years Les has been an active amateur palaeontologist and has made a number of significant contributions to various institutions. Besides his interests in palaeontology he is an accomplished musician (piano), maintains a large and varied library, and has a significant collection of modern shells.

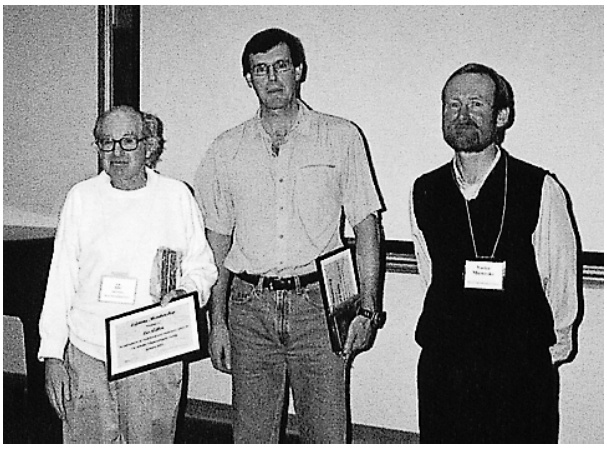
Don Sabo
Life Membership

Don Sabo was honoured with Life Membership at the recent Symposium. Don is one of the founding members of the Society and had also been an active member of the "Fossil Group." He was the first to propose that an official society be formed and has taken an active role in the Society since its formation in 1986. Don has served on the executive in numerous capacities: Vice-President, 1986–1988; President, 1988–1989; Past-President, 1989–1992; Education/Program director 1986–1987; Secretary, 1992–1999, and as the Society's representative on the Alberta Palaeontological Advisory Committee from 1994–2000. He has also made contributions to the *Bulletin*, the Society's collection, and given talks and workshops.

Wayne Haglund
Honorary Membership

Wayne Haglund has taught for over 30 years at Mount Royal College where he is noted for his serious and quiet demeanour. He received his BSc from Portland State University, his MSc at the University of Kansas and is currently completing his PhD at the University of Queensland (Australia). His research interests are Cretaceous oysters and their depositional environments, which has focused on the various marine incursions that occur within the Cretaceous of Alberta.

Wayne's relationship with the Society began in 1987 when he offered the use of the "Rock Lab" for our monthly meetings. Since that time Wayne has been an enthusiastic supporter of the Society and without his support we would not enjoy the success that we do today. Wayne's continued support and that of his colleagues in the Department of Earth Sciences has enabled us to hold the annual Symposium and continue to offer the variety of talks that we do. ❑



Left to right: Les Adler, Don Sabo and President Vaclav Marsovsky at the award presentation. (*Photo: Les Adler*)

2002 Society Elections

Election of officers and directors of the Society will take place at the May 24 general meeting. Candidates are needed for the following positions: President, Vice-president, Secretary, Treasurer, Fund Raising, Social, and Events/Field Trips. If you are interested in any of the positions or would like to volunteer to assist please contact any member of the current board. – *Wayne Braunberger* ❑

Membership Survey Results

by Dan Quinsey

Members received a survey with their renewal slips last year. The objective of the survey was to build an effective instrument the board of directors could use in the decision-making process. When processing any survey of this nature, the conclusions usually represent a general consensus of the membership and any one comment, good or bad, must be judged from all points of view. The ideas presented by the membership will be taken into consideration by the board. The identity of the members will be kept confidential by the Secretary of the Board. The results are summarized below.

A total of 28 surveys were received by the deadline, representing approximately 25% of the membership.

Age groups	1–10 years	5 members
	11–20	2
	21–30	1
	31–40	6
	41–50	13
	51–60	4
	61–70	9
	71+	6

The majority of our members are in the 31–50 and 61+ age groups.

Membership retention

46% of respondents have been a member 1–3 years.
8% have been a member 4–6 years.
15% have been a member 7–9 years.
31% have been a member for 10+ years.

Meeting attendance

Many of our members get to 1–2 or 6–8 general meetings for an average of 5 meetings per member. Out-of-town members who answered "zero" to the number of meetings they attend were not included in this calculation.

Occupations

48% of our members are experienced in the fields of earth sciences or general sciences. 35% of our members fall into various lines of experience from instructors and students to non-science fields. 17% of the respondents are retired.

Volunteering

A total of 32% of the members indicated they would be interested in volunteering (including those who already do). Those interested fall in the 41–60 age group representing 37% of our membership.

Interests

The majority of interests of our members fall into palaeontology, astronomy, geology, and the origins of life and the universe (in that order). Other interests include outdoor activities and a few non-active hobbies.

Expectations

The expectations of members fell into four simple groups:

Meet others with similar interests:	23%
Field trips:	23%
Education and general information:	37%
Fellowship:	17%

When asked if expectations were met, 89% of the membership replied "yes." 4% indicated expectations were not met and 7% were undecided as they indicated they were new members and had not yet had a chance to accomplish their goals.

Changes or improvements

The members were asked what they would change in various areas and why. The results are as follows:

General meetings

- Many of our members are happy and would change nothing.
- Have more activities directly related to children.
- Hands-on and developmental activities are lacking.
- The ventilation/air conditioning in room B108 is noisy and distracting.

- Meetings are too predictable; need more variety.
- A better variety of snacks and beverages are needed.
- Minutes of previous meeting should be read and voted upon by the membership.
- Announcements from members should be solicited.
- Hold meeting s on weekdays other than Fridays.

Bulletin

- Many of our members were happy with the *Bulletin*.
- Expand the *Bulletin* and content.
- Encourage letters to the editor.
- Encourage dialogue and confrontation as a form of entertainment.
- Needs more short commentaries.
- Needs more pictures.
- More input from members, possibly stories.
- Do not like fiction-based articles and cartoons.
- Less newspaper clips.
- Prefer book reviews.
- Prefer scientific palaeontological articles.
- Outstanding job, complements to the editor.

Presentations and Talks

- Once again, many members are happy with things as they are.
- Need a public address system.
- Need better acoustics.
- Would like to see more programs by learned amateur members.
- Need the occasional presentation for those who are amateurs and are just learning.
- Talks are too long, need to be shorter.
- How about two short presentations 15–20 minutes each?
- Fridays are difficult to attend.

Lecture Topics

- Good variety.
- Work in more recent biology, anatomy, evolution, etc.
- Key them down a bit.

Library

- Needs an index that is searchable.
- How about a permanent book case?
- Needs to be formalized.
- Time to browse at meetings is too limited.

Field Trips

- Many members are happy with our field trips.
- Vehicles need a marker to make them easier to follow.
- Too exhausting.
- Publish notes in advance of a trip.
- Make sure leader has previously visited the site.
- Pick sites that will produce fossils, do not like prospecting trips.
- Need trips closer to home.
- Need more trips that do not require a 4-by-4.
- Need better car pooling arrangements.
- How about a shared-expense vehicle for longer trips, such as a rented bus?
- Would like to see more trips to British Columbia.
- How about small trips to homes of members willing to showcase their collections?

APS Fossil Collection

- Bring a sampling to each general meeting for viewing or show and tell.
- Needs to be organized in cabinets in a central location.
- How about an inventory list available at the library?
- Acknowledge members for donations.

Social Functions

- Once a year is enough.
- Pot luck supper is too much work especially for those working on a Friday.
- Pot luck should be limited to snack or desert items to help move the meeting along.
- Be aware of diabetics when putting on a dinner type function.
- An art category should be added to the December photo contest.

Fundraising

- Consider an annual auction.
- Solicit more donations.
- Need more fund raising projects.
- Charge for outside education to schools and scouts for example.
- Raise the APS profile.

Education

- Need more courses for members.
- Need more help with fossil identification.
- Visits to more schools and libraries needed.

Meeting Dates and Location

- Many of the members are happy with the current format.
- Weekdays other than on a Friday.
- Would prefer Thursday evening.
- Transportation to Mount Royal College is difficult.

Communication

- Need more communication between board of

directors and members.
- Do not forget members without computers.
- People without e-mail usually feel left out.
- Those without computers feel excommunicated.

Membership Dues
- Increase to cover field trip expenses.
- Too low.
- Do not change.

Symposium

Although not originally a category, many comments were made:
- How about table displays of fossils from our members?
- Good function—a great success.
- Lighting is poor.
- Posters are becoming too technical.
- Need more amateur content.
- Divide posters into amateur and professional sections.

Finally, the members were asked what they felt was the most important thing they would change or not change.

Do not change…
- The good job the board is doing.
- Social events.
- Symposium.
- *Bulletin* (two replies)

Change…
- Get a proper public address system for meetings.
- Eliminate field trip fees.
- Get more volunteers for the executive positions.
- Renewing members deserve a pin.
- Communication.

Once again, the Board of Directors would like to thank those members who participated in the survey. ❑

What do you think of the survey results?
Like to comment?

Write a letter to the Editor!

Badlands tour guides wanted

In May of 2003, the National Science Fair is being held in Calgary. On the Thursday prior to the May long-weekend, approximately 200 of Canada's finest high school scientists and their chaperones will have an opportunity to visit the Tyrrell Museum and the badlands near Drumheller. If any APS members would be interested in volunteering to act as tour guides on one of the six buses, would you please contact **Arnold Ingelson**, at (403) 249-6748. Further details will be available as well as an itinerary in 2003. Thank You. ❑

Design our next T-shirt!

Society artists are invited to enter designs for a new edition of the APS T-shirt. Designs should be suitable for single-colour silkscreen printing, and should include the Society name and an Alberta theme.

Submissions should be photo-ready, on 8.5" x 11" to 11" x 17" paper. Deadline for entries is September 1, 2002, and the winning design will be selected at the September general meeting (Friday, September 20, 2002.)
Contact any member of the Executive (Page 1) to submit an entry, or for more information.

Program Summary

November 16, 2001
Conodonts, China and the Permian-Triassic boundary. By Dr. Charles Henderson, University of Calgary.

The Permian-Triassic boundary marks the greatest extinction in earth's history and yet, until recently, it did not have a precise definition. The International Union of Geological Sciences in March 2001 officially ratified the P-T boundary as the first appearance of the conodont *Hindeodus parvus.*

Conodonts represent the microscopic "teeth" of an early vertebrate that evolved rapidly during a 300 million year history from the Late Cambrian to Late Triassic. Unlike many other organisms, the conodont animal largely ignored the P-T boundary and exhibited only minor extinction at the species level.

A conference was held in Changxing, China during August, 2001 to officially "cut the ribbon" and unveil the monument at the Global Stratotype Section and Point at Meishan Section D (Bed 27c). The obvious excitement of this scientific decision resulted in a circus-like atmosphere and curious locals lined the streets and roads.

The talk discussed the P-T boundary and extinction as well as some of the geopolitics and local Chinese flavour that contributed to this decision. It also looked at the biologic affinity of conodonts and highlighted their evolution around the boundary.

– Abstract by Dr. Henderson

Biography

Charles Henderson is an Associate Professor at the University of Calgary and has been teaching palaeontology and stratigraphy for the past twelve years. His research concentrates on conodont biostratigraphy of the Late Palaeozoic and Triassic of western and arctic Canada and South China. He was a voting member of the Permian-Triassic boundary working-group and is heavily involved with the Subcommission on Permian Stratigraphy (SPS). He was the official SPS representative at the Changxing meeting and was one of three westerners to "cut the ribbon" alongside Chinese government officials.

December 14, 2001
Potluck Dinner and Palaeo Photo Contest.

Twenty three members enjoyed an assortment of excellent main courses, desserts and other goodies, in preparation for the second annual "Palaeo Photo Contest." Categories included:

"Prepared specimens"
"Fossils in the field"
"Scenic shots" and
"Palaeo humour"

First, second and third prizes were awarded in each category; Geoff Barrett took away the Grand Prize, a gift certificate to **China Rose Restaurant**, based on accumulated points. One of the winning entries is reproduced below; more can be seen (in colour) by logging onto our web site.

"Fossils in the field"—naturally weathered horn-coral (Carboniferous, probably Mount Head Formation) in outcrop; Ptarmigan Cirque, Alberta. Photo contest entry by Geoff Barrett.

More award-winning photos on our web site!

www.albertapaleo.org

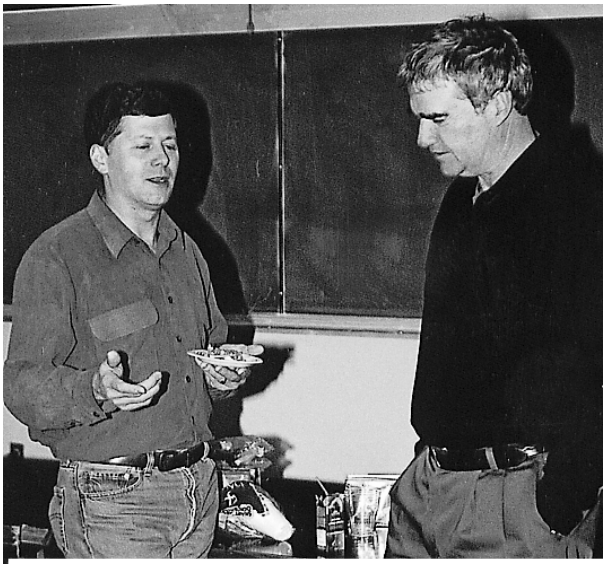
January 26–27, 2002
APS Sixth Annual Symposium, Mount Royal College

Despite a nasty January weekend that saw heavy snow and temperatures dipping to -27°C, we had another great turnout for our 2002 Symposium. Talks, poster displays and "hands-on" workshops covered an eclectic range of topics from all areas of palaeontology. Only one speaker and one or two poster presenters were unable to attend due to the weather. Participants came from as far away as Winnipeg, Seattle, Saskatoon and Norman Wells, NWT; as well as Edmonton, Drumheller and other parts of Alberta.

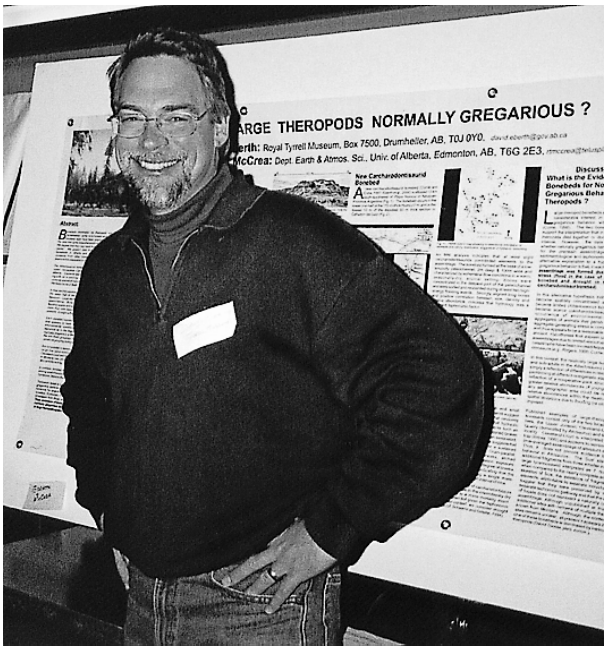
The Society wishes to express its deepest thanks to all of these scientists, students, professionals and APS members who donated their time and energy, plus the numerous volunteers, many of whom missed lectures and meals in order to man booths and set up equipment. Without our major sponsors, **Mount Royal College** and **Shell Canada**, the Symposium would have been impossible.

Thanks also to **Dr. Kris Vasudevan** and the Department of Geology and Geophysics, at the **University of Calgary**, for supplying poster boards, and to **China Rose Restaurant** for providing a fine wind-up dinner. Finally, thanks to all the attendees from the APS, various educational institutions and the general public, whose learning experience made the entire effort worthwhile.

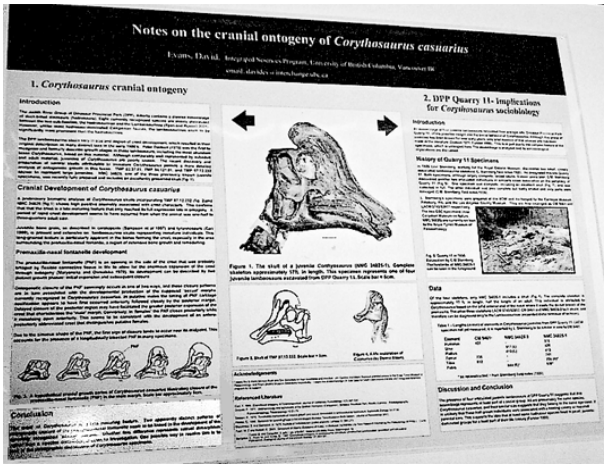
– Howard Allen ❑



Dr. Charles Henderson and keynote speaker/ author Dr. Peter Ward (right) discuss a point of Permo-Triassic contention over some ginger beef. (*Photo: Bert van Helden*)



Royal Tyrrell Museum sedimentologist Dr. David Eberth being gregarious at his poster display. (*Photo: Les Adler*)



UBC student David Evans' poster on the skull development of *Corythosaurus* was typical of the excellent work on display. (*Photo: Les Adler*)

Missed the Symposium?
It's not too late to take advantage of this great learning experience! Copies of our 80-page, illustrated Abstracts Volume are still available, for $10.00 each, plus P&H. Contact the Editor or Librarian, or write to the Society (see Page 1).

February 15, 2002
William Smith—the Man and his Map.
By Dr. Russell Hall, University of Calgary.

On awarding William Smith the first Wollaston Medal of the Geological Society of London in 1831, its President, Adam Sedgwick, dubbed Smith "the father of English geology," adding that it was Smith who "gave the plan, and laid the foundations, and erected a portion of the solid walls [of the newly emerging science of geology] by the unassisted labour of his hands." Prior to this award, Smith had been poorly treated by the scientific elite of his day, and reduced to bankruptcy, in his determined efforts to produce the first geological map of any nation. His discoveries had also been periodically plagiarized for profit by men Smith considered personal friends or scientific colleagues.

William Smith was a largely self-taught surveyor who spent much of his life travelling around England surveying coal mines, routes for canals and draining swampy areas for agricultural purposes. However, during all of this travel, his main interest was in examining and collecting rocks and fossils in order to confirm his belief that sedimentary strata were always found in the same order of superposition and could be identified by the unique fossils they contained. This led to his enunciation of what we now call the Law of Faunal Succession, and his application of this principle to map out the geological strata of England, Wales and part of Scotland.

After many financial crises and personal disappointments, Smith's fully coloured geological map of England and Wales was published in 1815. This talk outlined Smith's life, concentrating on issues involved in the production, financing and publication of the map, which was described by one French reviewer of the time as "beautiful in its results" and "amazing in its extent."

– Abstract by Dr. Hall ❑

The *Bulletin* by email?

I'm putting out feelers to see how many members would be interested in receiving the *Bulletin* by email, in Adobe Acrobat ™ PDF format, which can be read, printed and searched using the free Acrobat Reader application. "Pros" include saving the Society printing and mailing costs; also, some content could be in colour. "Cons" include big file sizes (3–5 MB or larger), which may be inconvenient for those with slow dial-up connections. Interested? Drop me a note: **editor@albertapaleo.org**. *– Howard Allen* ❑

The Urban Fossil Collector

by Dan Quinsey

The Society received a question through our website from Andreas Kyprianou who is doing preliminary research for an upcoming program on the Discovery Channel about dragons.

Q: Did dragons ever exist?
–Andreas Kyprianou.

A: Thank you for your inquiry. I suppose dragons were real at one time, at least to the explorers who found them. For example, the Kaiserliche Leopoldimische Akademie, a German society of scholars, reported that in 1672–1673 dragon bones had been found in caves in the Carpathian Mountains of eastern Romania and in Transylvania. We can tell from the drawings accompanying the article that the creature was actually a cave bear.

Also in the 17th Century, the partial skeleton of a dragon said to have been slain by a young hero (according to a local legend that thrilled fireside listeners in rural areas as recently as the early 1900s) was found near Mixnitz in the Austrian province of Styria. It, too, belonged to a cave bear.

When we encounter something not yet described, or something we do not understand, we tend to speculate and build fabulous exotic tales surrounding the find. Modern day examples include Bigfoot and the Loch Ness Monster. When dinosaur bones were first discovered many years ago, experts of the day did not know how to explain them other than with the legends and folklore you hear of today. Dragons were popular legends of the time because they were sensational and fed the imagination of the population.

Dragons are no more real than Santa Claus. Or are they? In a child's mind, Santa is as real as mom and dad. Therefore we must conclude that dragons existed in the minds of many people until recent times, when the study of fossils began to evolve and a more factual explanation was given for fossil bone discoveries. [*More UFC on Page 16!*]

[*Send your questions directly to Dan Quinsey at* **quinseyv@cadvision.com**, *or write to the Society's mailing address (see Page 1), c/o Dan Quinsey.*] ❑

Man and Beast: 5 Million Years in Wallacea

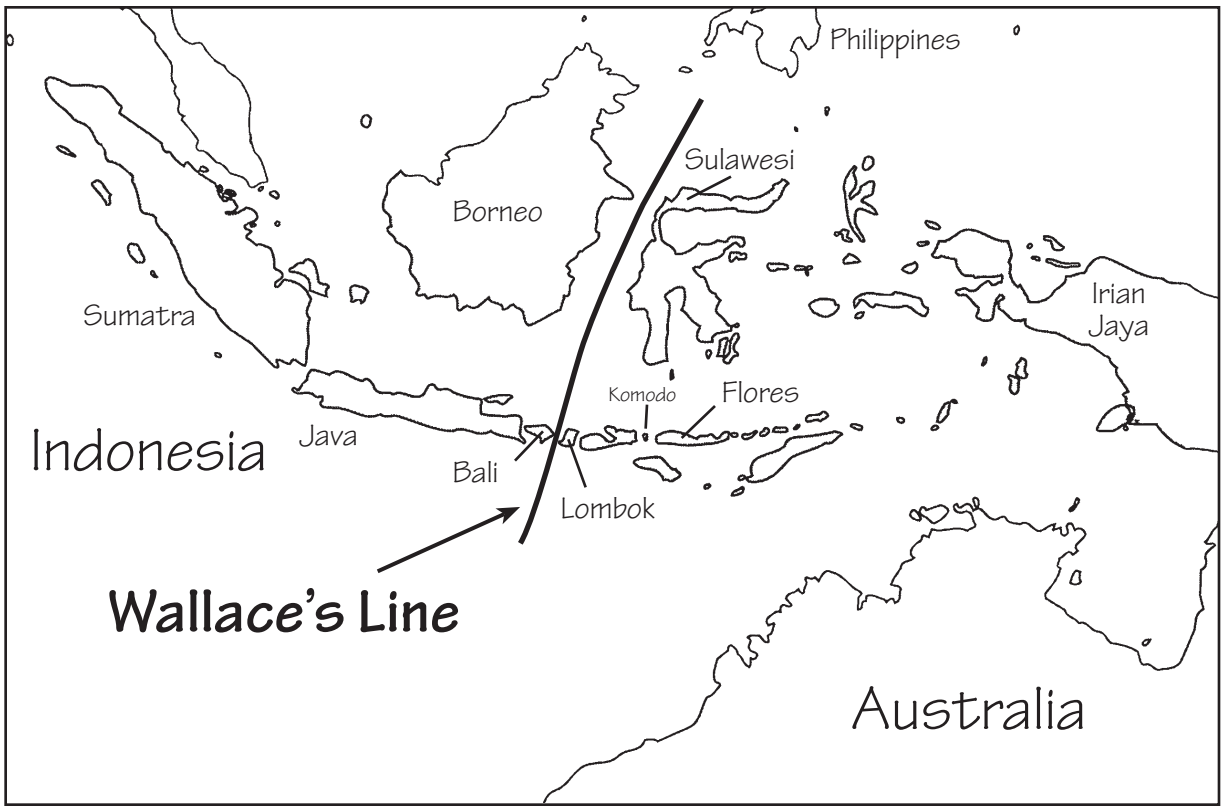
By Philip Benham (Copyright, ©2002)

Last October my son Peter and I spoke about the biology of Komodo dragons (*Varanus komodoensis*) and the evolution of the varanids, a group closely related to snakes but containing the monitor lizards and the extinct marine reptiles, mosasaurs. One of the topics we covered was man's interaction with the monitor lizards. As an aside we briefly mentioned the discovery, on the Indonesian Island of Flores, of varanid remains intermingled with stone artifacts attributed to *Homo erectus*, precursor to modern man.

Some recent papers have been published that flesh out the story of the rise of man and the decline of the megafauna characteristic of the latest Tertiary in Australia. It is this tale, supplemented with information provided by Dr. Mike Morwood, University of New England, Australia, that I wish to recount.

Dry and cold deserts and ocean deeps divide the modern world into six distinct regions of flora and fauna; each separated by typically species-poor transition zones. One of these, Wallacea, is the geographic region that lies between Southeast Asia and Australia. It primarily comprises the thousands of islands that make up the nation of Indonesia.

Islands naturally form barriers to the movement of animals, but much of the Indonesian Archipelago would have been joined together during the Ice Age, when global sea level was as much as 150 m lower than it is today. Borneo, Java, Sumatra and Bali were joined and then isolated several times to the Asian mainland during the cyclical glaciations that characterize the Pleistocene. A deep trench runs northeast between Bali and Lombok to the east. It was deep enough that a strait of water 25–30 km in width persisted during the Ice Age. This barrier prevented dispersal of fauna and flora and separates the world of tigers from the world of kangaroos.



Map of Indonesia, showing location of Wallace's Line. *(Adapted from Spice Islands Voyage, a school curriculum project coordinated by the University of Limerick in Ireland: www.runet.edu/~swoodwar/ CLASSES/GEOG235/ zoogeog/walline.html. Base map from www.nationalgeographic.com/xpeditions.)*

In the 1850s, British naturalist Alfred Russel Wallace spent eight years observing the flora and fauna of the East Indies. From his work there and in Brazil he independently came up with the theory of evolution, and sent a manuscript to Charles Darwin for comment. A despairing Darwin, seeing his twenty years of work pre-empted by Wallace had to be convinced by Charles Lyell and others to jointly publish a paper in the *Journal of the Proceedings of the Linnean Society*. And so was published on the twentieth of August, 1858: "On the Tendency of Species to form Varieties; and on the Perpetuation of Varieties and Species by Natural Means of Selection" co-authored by Darwin and Wallace. Darwin received the main share of the fame for one of the most important discoveries in the history of science and Wallace today is considered the father of biogeography. The geographical boundary that he documented between Asian and Australian faunas became known as "Wallace's Line."

We will get back to Wallace's Line, but first the clock needs to be rewound to 5 Ma (million years ago). At the beginning of the Pliocene the world position of the continents looked pretty similar to today. Closer inspection reveals some subtle but critical elements that had a significant impact on the world climate. North and South America were separated at the Isthmus of Panama.

Of interest to us, Australia and New Guinea were south of their present position by 2–3 degrees of latitude (Cane and Molnar, 2001). This gap allowed the warm South Pacific Current to flow along the equator and west into the Indian Ocean. Warmer ocean surface temperatures resulted in a moist climate in East Africa. Continental drift brought Australia northwards at a rate of 70–100 km per million years, gradually narrowing the gap through which the South Pacific Current could flow. Between 3 and 4 Ma BP (million years before present), tectonic goings-on within the Indonesian Archipelago forced a switch to the North Pacific Current. The colder waters of this current forced a cooler, drier climate upon East Africa. Fossil evidence (in the form of pollen and mammal remains) suggests rainforests lasted in Ethiopia to about 3.4 Ma BP, and by about 2.5 Ma BP most of East Africa lay under a mantle of grasslands (Cane and Molnar, 2001).

Some speculate that the change from forest to savanna drove early hominid evolution in Africa. It certainly altered the path of other organisms: antelopes and smaller mammals underwent significant changes around 2.8 Ma BP (Vrba, 1995). *Australopithecus afarensis* went extinct some time around 2.5–3.0 Ma BP, to be replaced by "robust" Australopethicines and our genus, Homo. This time of change is also coincident with the first rudimentary stone tools in Ethiopia. By 1.8 Ma BP *Homo erectus*, ancestor of modern man, had arisen and begun migrating to Europe and Asia.

In fact, one of the first discoveries of the ancient hominid lineage occurred in Java, cited at the time as strong evidence for man's origins in that part of the world. In 1889, a Dutch army doctor by the name of Eugene Dubois, began a survey of the fossil-rich strata of central Java. He found a variety of mammal remains but he was searching for Darwin's "missing link." On the banks of the Solo River the sediment yielded the teeth, skullcap and femur of what closely resembled a man, yet still had ape-like characteristics. He published in 1894, naming this creature *Pithecanthropus erectus*, or literally "erect ape-man," as he thought it too primitive to include within the genus *Homo*. With the theory of evolution now well ensconced in scientific thought, there were ripples through the academic world. Here was our direct ancestor—what better proof of evolution, and that we were involved in the process, too!

Numerous expeditions searched the region for further remains. The site of the original discovery was essentially mined, in a vain attempt to recover more of ancient man. These efforts lead to a good understanding of the context in which *Pithecanthropus* was found. His bones lay mingled with other mammals between a lahar—a volcanically induced sediment flow, and numerous tuffs—fallout from eruptions in the area. The still active volcanoes Gunung Merapi and Merbabu bound the basin in which the remains were found. Java Man had company in his bone bed. The layer yielded elephants, including the pygmy tusker *Stegodon*, rhinoceros, tapirs, hippos, antelopes (*Leptobos*), cats, giant pangolins and macaques, all with an affinity to fossil remains of similar age in Siwalik, India (Boule and Vallois, 1957).

It was clear to researchers long before plate tectonics and the rise and fall of sea level due to glaciation were generally accepted, that some sort of land bridge connected these islands to the rest of Asia. For over forty years after the initial find, successive expeditions turned up more of *Pithecanthropus*, a hominid who grew to perhaps 168 cm (5' 6") and had a brain capacity maybe two-thirds of modern man's. *Pithecanthropus* has since been renamed *Homo erectus*. The earliest convincing dates for arrival of H. erectus

in Java are about 1.2 Ma BP, but there is some fossil evidence for his arrival at least 1.8 Ma BP. Fossil remains and artifacts provide a record of Java Man to about 300,000 years BP. Then, nothing—until 40,000 years BP or so, when modern humans arrived in the region, perhaps the forefront of a wave that dispersed out of Africa around 200,000 years BP.

Coincidentally, not far away from the first discovery of *Homo erectus* lie the massive stone ruins of Borobudur, the largest Buddhist temple ever built and Prambanan, the Hindu equivalent, hewn out of dark blocks of andesite. Here, at one of the more prolific sites for man's progenitor, early civilizations reached their monument-building peak. They were simultaneously wiped out around 950 AD by one of Merapi's fiery emissions.[1]

Borobudur, massive Buddhist temple on the same volcanic plain in Java that *H. erectus* strolled a million years ago. *H. sapiens* for scale.
(*Photo by the author.*)

Homo erectus colonized Java and presumably Borneo and Bali, as they were connected to the Asian mainland. But his migration apparently ended there, blocked by the stretch of ocean known as Wallace's Line. On a clear day perhaps primitive man, upon ascending the peak of Gunung Agung, Bali's highest and most holy volcano, peered across the waters to a green smudge on the horizon. That distant patch of green was Lombok, the continuation of the Indonesian Archipelago reachable only by boat. But *Homo erectus* was lacking the intelligence and therefore the linguistic and technological abilities required to surmount this problem—or so we thought (Morwood, 1998). In fact, conventional wisdom has man not capable of sea travel until around 52,000–60,000 years ago, when the forerunners of the Aborigines colonized Australia (Roberts *et al*, 2001).

We've talked about man, but what about beast? The earliest fossils identifiable as monitor lizards (*Varanus*) are known from only fragmentary remains in Khazakstan and date to about 25 Ma BP. Better fossil remains come from the Lake Victoria region of Kenya. *Varanus rusingensis* was a 2 m-long lizard, quite similar in appearance to the Nile monitor (*V. niloticus*) and similarly feeding on molluscs. Fossil evidence suggests that by 10 Ma BP the monitor had reached Australia, presumably via the Indonesian Archipelago, by swimming or clinging onto drifting logs. Genetic characteristics of modern monitor lizards may push the date of this Australian arrival back to 20 Ma BP, but that work is still in progress. The monitor is a good swimmer and, having a reptilian low metabolism, could have survived long stretches without food. It could surmount the barrier presented by the considerable ocean between Australia and southeast Asia.

The fossil record of the monitor in Indonesia is limited. *V. hooijeri*, related to the present Gray's monitor[2] is found on Flores in strata younger than 5 Ma. Scattered remains of *V. bolkyai*, almost identical to the modern *V. salvator* are also known from 2 million-year-old strata in Java and Timor (Auffenberg, 1981). This 3 m-long water monitor is widespread in southeast Asia and is known to coexist with the Komodo dragon. The Komodo dragon is speculated to have evolved in this time-frame, which brings us to the first record of contact between man and monitor in Wallacea.

The Soa Basin is a sedimentary basin located in central Flores. Flores is adjacent to Komodo Island and a large part of its northern and western shoreline once supported a healthy Komodo Dragon population. Pressure on the dragon by rising human popu-

[1] Merapi, "fire mountain" in Bahasa Indonesia, is more prone to lahar flows than any other volcano in the world. It is also situated in a densely populated piece of Java and beautiful Yogyakarta a city of 3 million souls sits only 20 km away. Since 1548 the volcano has erupted 68 times. A stunning 67% of worldwide volcano related deaths since 1500 have occurred in Indonesia.

[2] Curiously, Gray's monitor, a 2 m-long lizard, was known only from a juvenile specimen studied in the 1850s. The monitor was well known to locals on the island of Luzon in the Philippines but the secret of its size remained with them. In 1906 an adult skin finally made it to the hands of scientists who named it after a John Gray (*Varanus grayi*). It wasn't until the 1980s that the mistake was discovered and the original name (*V. olivaceous*) was restored to this fruit and snail eater.

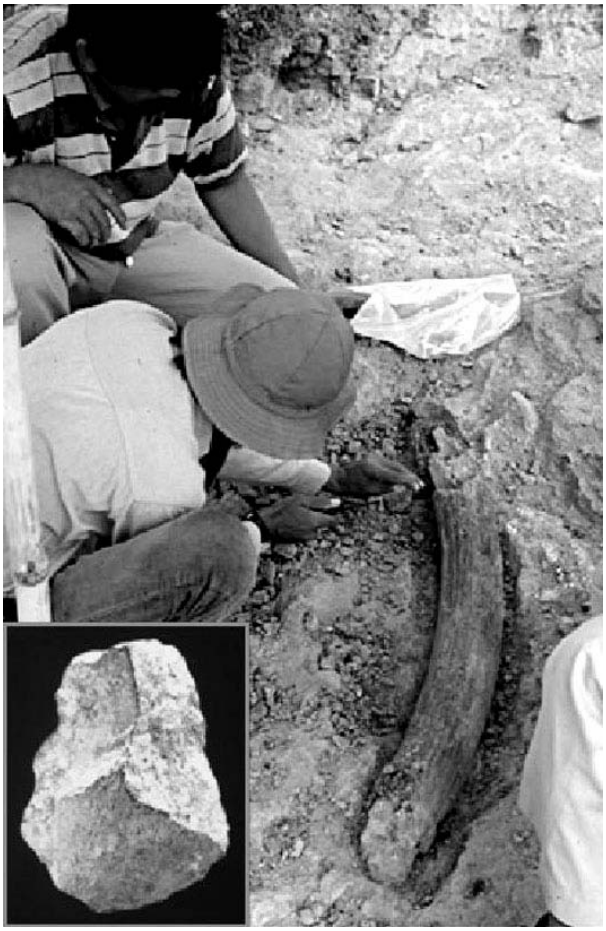
***Varanus komodoensis,* the Komodo dragon.** (*Photo by the author*)

lation and land use has restricted it to isolated portions of Flores and the islands offshore. It has the smallest range of any top-of-the-food-chain predator in the world.

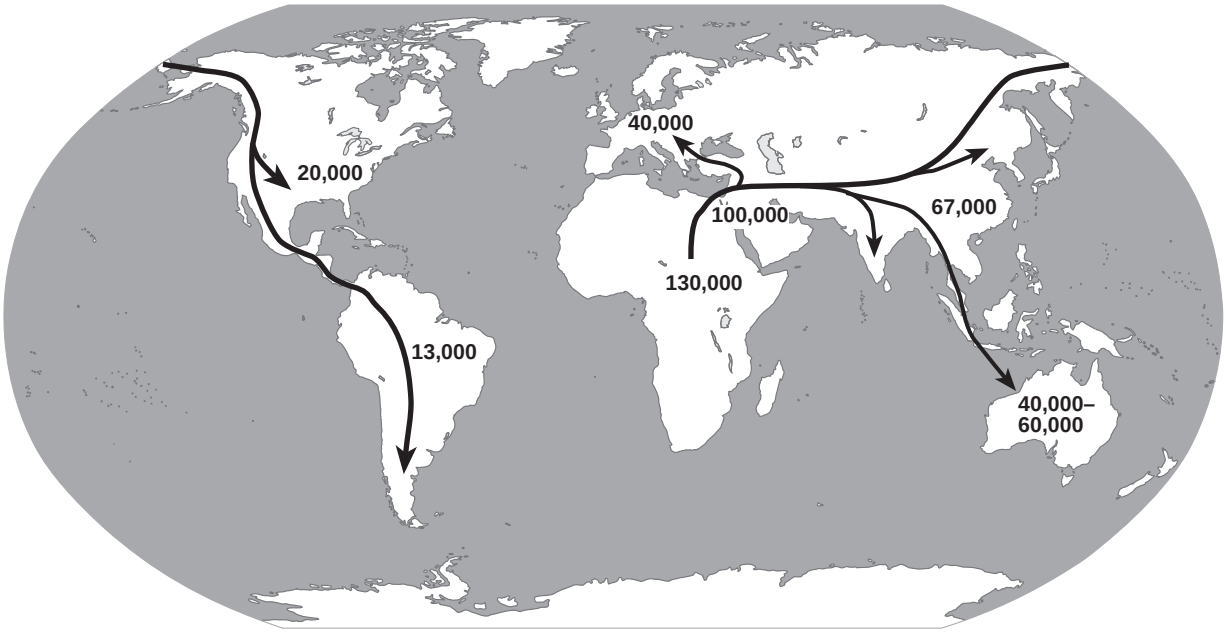
Flores was once a Portuguese colony and still has a large Catholic population. In the 1960s Father Verhoeven, taking time out from his priestly duties and cultivating an interest in archaeology, reported finding stone artifacts at several sites within the Soa Basin. He estimated the tools were 750,000 years old, based on their association with large *Stegodon* fossils. This would imply that *Homo erectus* had somehow made it across Wallace's Line and another persistent 9 km wide strait of water immediately west of Flores. Presumably the only means by which *H. erectus* could do this is by ocean travel. Verhoeven was discounted as an amateur until excavations in the mid 1990s by professionals turned up the same association at one of his sites known lyrically as Mata Menge. Besides *Stegodon trigoncephalus florensis*, scientists found the remains of crocodile, giant rats *(Hooijeromis nusatenggara),* freshwater molluscs and plants. An older site at Tangi Talo, perhaps 900,000 years old, lacked stone artifacts but contained a fauna that included the pygmy *Stegodon sondaari*, the giant land tortoise *Geochelone* and *Varanus komodoensis*. There appeared to be a distinct change in fauna through time, coincident with the appearance of hominids.

Still, there were doubters as to the accuracy of the dates and to whether the artifacts were man-made. Since the mid 1990s a group of Indonesian and Australian scientists have made a concerted effort to map out the Soa Basin and put conclusive radiometric dates on the strata. The tools turn out to be identical to those generally agreed to have been created by *H. erectus* in other parts of the world. Further, many of the tools were made of chert, which was not local to the Soa Basin (Morwood, 1998). This implies early *Homo* was willing and able to transport materials of value. A defining characteristic of man is that having developed the ability to walk on his hind limbs, his hands are freed-up to carry food, weapons and other belongings. Given this freedom he was able to work stones into useable tools and scratch art into rough walls. As these technologies developed so did his brain.

With the burden of proof out of the way we come to the question how did *H. erectus* get to Flores around 840,000 years ago? Our geological knowledge is complete enough to know that the Bali-Lombok and Sumba-Flores waterways were deep enough to persist even during the lowest sea level drops of the Pleistocene and wide enough to prevent fortuitous crossing by man. Previously it was thought that the earliest proof of boat travel is the arrival of *Homo sapiens* in Australia perhaps 60,000 years ago. The



***Stegodon* tusk being excavated at Dozu Dhalu in the Soa Basin, Flores, Indonesia. The specimen, dated at 850,000 years old, is shown with a stone artifact (inset) from the slightly younger Mata Menge site.** (*Photo courtesy of Dr. Michael Morwood.*)



Theoretical dispersal and timing of *Homo sapiens* "out of Africa." Figures, representing years before present, are subject to debate. *(After Hedges, 2000; base map from www.nationalgeographic.com/xpeditions.)*

finds on Flores imply that long before man hopped onto a raft for a jaunt to Australia, *Homo erectus* was able to achieve maritime travel and colonized Eastern Indonesia (Morwood et al, 1998).

The fossil record is scanty and you take what it gives you in order to fill in the blanks. In 2001, Australian Michael Morwood and colleagues shifted their investigations to Ruteng in Western Flores. They focussed their work on a large cave called Liang Bua (or "Cold Cave"), excavating and sieving the sediment that has accumulated since the formation of the cave. The youngest strata, sitting upon a travertine layer, include remains of *Varanus hooijeri* dating as far back as 17,000 years BP (Morwood, pers. comm, 2002). Below the travertine layer are the fragmentary remains of giant tortoise, dwarf *Stegodon*[3], a yet to be identified varanid, hominids and stone implements (choppers and borers). This fossil-rich stratum could be up to 100,000 years old (Morwood, pers comm., 2002). The hominid remains include teeth, portions of a cranium and pelvis that may belong to *Homo erectus.* Although the remains are yet to be formally identified, this would put the existence of *H. erectus* in Flores firmly into the interval when modern man was travelling the Indonesian Archipelago and ultimately colonizing Australia. There are a number of caves in the karsted region of western Flores and the investigation into the fossil record during this period in Wallacea is just beginning. The lack of certain megafauna in the younger strata is mirrored in Australia—our next destination.

When the first humans (*H. sapiens*) arrived in Australia 56,000 (±4,000) years ago they found a fearful world populated with large and unusual creatures. Giant birds (*Genyornis newtoni*), 3 m-high flesh-eating kangaroos (*Sthenurus)*, marsupial lions *(Thylacoleo carnifex)*, giant wallabies (*Protemnodon*), hippo size wombat-like creatures (*Diprotodon*) and 6 m-long constricting snakes (*Wonambi naracoortensis*)[4] all roamed the landscape. But this wasn't the worst of it. The top of the food chain was occupied by a 600 kg, 7 m- long cousin of the Komodo Dragon, *Megalania prisca.* This creature is the largest land-dwelling lizard ever recorded. In fact, only Cretaceous school bus-sized crocodile *Sarcosuchus imperator*, the

[3] It is likely that the Komodo evolved its considerable size to maximize its chances of snagging the large prey that was common to the region; dwarf elephant *Stegodon,* giant tortoise, the 50 cm-long rat *Papagomys* and other large mammals. Ultimately most of this megafaunal prey went extinct but the Komodo now appears to thrive on animals introduced by man; pigs, goats and cattle.

[4] This may be the rainbow snake integral to the Aboriginal Dreamtime legends. This magical snake is associated with creation, fertility and rain (perhaps harking back in aboriginal memory to the moister Australia of 50,000 years ago). In floods the serpent is thought to swallow up people and animals, spitting out their bones which would then turn to stone. Were the first peoples recording in their oral history an explanation for the fossil remains they were finding?

hunter of dinosaurs, was bigger.

By around 46,000 years ago all of the Australian megafauna (creatures over 100 kg) and over 80% of the mid-sized genera (45–100 kg) had gone extinct (Roberts *et al*, 2001). The two main theories explaining why they might have gone extinct are: climate change and the "blitzkrieg" model (where man the hunter has a disastrous impact on the food chain). Roberts quotes an early proponent of the blitzkrieg theory, Sir Richard Owen, who in 1877 stated: "…to what cause, it may be asked, is due the extinction in Australia of the [megafauna], with the larger species of existing genera of Kangaroos and Wombats? No adequate cause suggests itself to my mind save the hostile agency of man."[5]

There are conflicting opinions as to the final extinction date of the Australian megafauna but here is how things appear to have occurred: Man first arrives sometime around 56,000 years BP, just prior to a period in which the continent was arid until 50,000 BP. In spite of the abundant and diverse large animal fauna and man's primitive technology he was able to hunt quite successfully. Perhaps, similar to the naiveté displayed by the dodo and animals in the Galapagos, these beasts were not familiar with man the hunter. He could have snuck up quite close to make a kill. During this time man found that he could set fires to chase prey into traps. Fires, once set, could range across large tracts of land unchecked, killing indiscriminately. The landscape changed as tree and shrub cover decreased. The vegetation change had a negative impact on fauna such as giant bird *Genyornis*, which ate those kinds of plants (Johnson *et al*, 1999)[6]. The youngest well-dated fossil remains of this bird (bones, tracks and *burnt* eggshell fragments) date to about 50,000 years ago (Miller *et al*, 1999).

A collective study of well-dated Pleistocene sites across Australia, containing only articulated specimens, suggests a relatively diverse megafauna (including *Diprotodon, Thylacoleo, Protemnodon*, and *Simosthenurus*) persisted until 46,000 years BP (±5000 years) (Roberts *et al*, 2001). And then… nothing.

Within perhaps 10,000 years of man's arrival every large creature native to the continent had gone extinct. Claims have been made for younger fossil sites, the most compelling of which is at Cuddy Springs. Here a variety of bones (including *Genyornis, Diprotodon* and *Sthenurus*) associated with blood stained artifacts and signs of butchering were dated to 36,000 years BP (Furby, 1996). This site has several shortcomings: bones were disarticulated and appear to have been mixed with younger deposits (in the claypan of an ephemeral lake) and so it does not appear to have a valid claim. The growing body of evidence seems to support extinction well prior to the extreme arid period that struck Australia during the last glacial maximum about 20,000–22,000 years ago (Roberts *et al*, 2001).

There certainly seems to be evidence of Aboriginal interaction with wildlife upon their arrival. Rock art in the Flinders Range was observed by H. Basedow in 1914 to include representations of footprints resembling *Genyornis* and *Diprotodon.* Furthermore, there was a patina over both stone and paint resembling that covering Egyptian monuments that are more than 5,000 years old (Boule and Vallois, 1957). Given the last fossil occurrences of these animals the rock art would have to be more than 45,000 years old. Since that early discovery several other sites have been found with footprints that more resemble *Genyornis* than the extant Emu. Recent attempts to put ages on the paintings using optically stimulated luminescence (OSL) and accelerator mass spectrometry (AMS) radiometric dating have pushed the age of the earliest rock art in Australia to at least 40,000 years ago.

This pattern of human colonization followed by mass extinction has repeated itself around the world—New Zealand, Madagascar, the Americas. Large mammal fauna seem to have mostly gone extinct over several hundred years around 11,400 years BP in North America (Elias, 1999). This is coincident with the appearance of Folsom points (spearheads) throughout that continent. Was man really that deadly? John Alroy, of the National Center for Ecological Analysis and Synthesis at the University of California, has come up with an interesting model to simulate the impact of human arrival in North America upon the fauna there. His model excludes climate change and secondary ecological effects but includes as variables hunting ability, growth rate, population density, meat in diet, dispersal ability of prey species and

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[5] While the existence of fossil remains was long known to the Aborigines they were first discovered by settlers in 1831 in caves near Sydney. They were sent to Richard Owen who identified many new giant marsupials and birds.

[6] Through the analysis of stable carbon isotopes in *Genyornis* eggshell, scientists were able to determine it was a "C3" plant eater—one that preferred shrubs and trees to grasses. The extant emu (*Dromaius*) was a "C4" plant eater, meaning it ingested a broader range of vegetation and was able to adapt to an increasingly grassy Australia.

location of man's invasion point (Alroy, 2001). He assumed human entry into North America at 14,000 years BP and ran various scenarios. His model correctly predicts the extinction or survival of 32 out of 41 "prey" species. Almost all scenarios result in extinction of the majority of fauna within 800–1,600 years of man's arrival on the continent (Alroy, 2001). He believes the survival of large fauna (such as bison or muskox) is due to their populations being set in areas where secondary food sources were limited to man.

Absence from the fossil record does not absolutely imply extinction, although it is a pretty good indicator. The celebrated *Coelacanth* reappeared in 1938 off the African Coast after being M.I.A. in the fossil record since the Cretaceous. This places it in the informal category of living fossil.[7] One wishes that somehow these animal wonders, making it oh-so-close to the present, could also have survived in some remote wilderness area.

Cryptozoologists are those dedicated to tracking down and identifying fauna not yet described by science or those thought not to be still extant. Australia provides great fodder for cryptozoologists, as there are still reports that some of the megafauna survive today. The thylacine ("Tasmanian wolf") and giant marsupial cats have been the subject of sightings and debate intermittently through the Twentieth Century.

A number of *Megalania* sightings are also on record including one in 1975 where a pair of farmers got out of their vehicle to remove a log from the road. The "log" turned out to be a giant monitor lizard, which generously chose to move itself for them. In 1979 a herpetologist by the name of Frank Gordon was searching for skinks in the forests of the Wattangan Mountains and instead reportedly came across a 9 m-long monitor. Australian cryptozoologist Rex Gilroy displays on his webpage plaster casts of large lizard footprints attributed to *Megalania,* found in New South Wales in 1979.

Mysterious large lizards aren't the sole domain of Australia. A 10 m-long, man-eating lizard called an "Artrellia" by the natives in Papua New Guinea is reported to lurk in trees and dive onto unsuspecting prey. Soldiers based in New Guinea during the Second World War sighted lizards they estimated to be about 6 m long. The creature soon became known as the "Papuan Dragon." Expeditions in 1978 and 1980 yielded a fuzzy film and then a specimen that locals claimed was a juvenile Artrellia. The creature was an adult Salvadori's Monitor (*Varanus salvadorii*) another large member of the monitor clan that reaches 2 m in length. It is known locally as the tree crocodile for its arboreal habits and is the likely source of all the stories.

For now our nightmares will have to be restricted to the Komodo dragon; 3 m long, razor sharp teeth, nasty claws, armour-plated hide, bellicose disposition, toxic saliva…who needs fiction when the truth is strange enough? ❑

[7] One of Australia's representatives, the Wollemi Pine, was recently found in a valley in a remote part of the country. It has a fossil record that dates back about 150 million years and is closely related to the Norfolk Island Pine. [See "The Wollemi Pine: Dinosaur Tree" by Vaclav Marsovsky, *Bulletin*, June 1999. – *ed.*]

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(*Many of these you can find on the internet with a few key words on www.google.com*)

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For pictures of Rex Gilroy's recent *Megalania* footprints visit: **http://www.internetezy.com.au/~mj129/ amazing_creatures_lizards.html** ❑

The Urban Fossil Collector

by Dan Quinsey

In this supplement, I would like to reprint part of an article on specimen storage written by **Sally Shelton** for the **Austin Palaeontological Society**. Sally Shelton is the Collections Officer for the National Museum of Natural History, at the Smithsonian Institution in Washington, DC. I would like to thank Sally for giving me permission to reprint her article.

Specimen Storage (Copyright ©, Sally Shelton)

If the fossils are boxed or sealed in plastic, using cotton is not a problem. The plastic might be, though. If it's an inert plastic like Mylar, there shouldn't be much problem except for soft matrix materials (Mylar is surprisingly abrasive). If it is a PVC or PVDC plastic, though, it will lose plasticizers in a short time and can actually stick itself all over the specimen and be very difficult to remove without doing damage. (The plastic notebook covers that peel the print off

Member Fred Lewis, of Carmel, Indiana, sent this remarkable picture of a groundhog skull (*Marmota monax*) pathology, from the collections of the Indiana State Museum. The animal's teeth, which grew throughout life, finally penetrated the roof of the mouth, due to lack of sufficient wear. (*Copyright © 1990, by Fred Lewis*)

paper are PVC plastics, and the damage is not reversible.)

It's very easy to figure out if the plastic is archivally stable or not. (As a graduate of Texas A&M, I need all the easy tests I can find…)

You need a scrap of the problem plastic, a copper wire 12 inches long with a small loop at one end, and a Bunsen burner or other lab burner with a clean flame showing a blue cone. Heat the loop in the blue part of the flame to burn off any contaminants, touch the hot loop to the plastic scrap to melt a sample onto the wire, then put the loop back in the blue cone of the flame. If the sample burns with a spectacularly beautiful green color, you have a chlorine-containing plastic and should not use it for boxing, encapsulating, or sealing specimens. If not, you may not have a perfect plastic, but at least it's not the most unstable kind. This is called the Beilstein test.

For more information on plastic films and their stability, check out the SPNHC technical leaflet, *Guide to the Identification of Common Clear Plastic Films* at **http://www.geo.ucalgary.ca/spnhc/**, following the links from "Publications". What they say about film plastics also goes for thicker slabs of the same material used to make boxes, etc. ❑

Reviews

by Les Adler

Madagascar's Mesozoic Secrets

by John J. Flynn and André R. Wyss, with a note from Kate Wong. Scientific American, February, 2002, p. 11, 54–63.

Flynn is MacArthur Curator of fossil mammals at the Field Museum in Chicago and adjunct professor, University of Illinois at Chicago. Wyss is a professor of geological sciences at the University of California, Santa Barbara and a research associate at the Field Museum. Kate Wong is a writer and editor at *Scientific American.*

240 million years ago, Madagascar was sandwiched in between east Africa and western India as part of Pangaea. Today the Mozambique Channel spans 400 km. between Madagascar and east Africa. The island is about 1,000 km in length and up to 300 km wide. Two-thirds of the eastern side contains crystalline basement rocks while one-third on the west side contains Mesozoic sedimentary rocks, with another thin sliver on the east side running southwest to northeast across the island.

The authors were fortunate to hit it rich in 1996 with fossil discoveries, after many interruptions. They found primitive Triassic dinosaurs and mammals that weren't supposed to be there.

Other palaeontologists work in fossil-rich locales in South Africa, Brazil, Antarctica and India. The authors felt that Madagascar's Mesozoic rocks hadn't been closely looked at. They had the cooperation of geological students and staff from the University of Antananarivo, in Madagascar's capital city. Difficulties arose and were coped with, such as food and fuel shortages, sapphire boom-towns, parasites and scorching temperatures.

Large scale maps of the Mesozoic rocks are available. Fortunately, rift basins covered by sediments have preserved fossil vertebrates which were not destoyed by geological action such as volcanoes. Finds have included unfamiliar, long-extinct parrot-beaked cousins of the dinosaurs called rhynchosaurs and a six-inch skull of a plant-eater, neither mammal nor reptile, called a traversodontid cynodont, being the world's best-preserved examples. Prosauropod dinosaurs also occur. The search is now on for the common ancestor of all dinosaurs on a relatively poorly known interval of Triassic rocks 240 to 230 million years old.

Jurassic mammal remains were found in sediments processed at the Field Museum, pushing back the presence of mammals by 25 million years. Perhaps a sub-group of mammals evolved in the Southern Hemisphere rather than the Northern, as is commonly supposed.

Tiny Bones to Pick by Kate Wong (same issue, p. 11)

Flynn and Wyss are finding in a remote part of northwestern Madagascar the earliest remains of Jurassic Period shrewlike mammals, 167 million-year-old *Ambondro mohabo*, with "tribosphenic" molars. Zhexi Luo of the Carnegie Museum of Natural History in Pittsburgh suggested that a fossil from Australia, *Ausktrobo sphenos myktos* might represent a second line of tribosphenic mammals that gave rise to egg-laying mammal monotremes. The problems in interpretation are due to the fact that very few mammal fossils of these types have ever been found.

Kate describes the daily activities of searching for fossils in Madagascar, with a sketch and a photograph

(*Continues on Page 21*)

APS 2002 Field Trips

Onefour, Alberta
June 22 – 23, 2002 (Saturday & Sunday)

Day 1: Saturday, June 22, 10:00 A.M.

Meet at the Onefour Dominion Farm headquarters/Onefour Research Substation (a.k.a Onefour itself). Onefour is located on highway #502, which is gravelled; see map.

This will be the Society's second excursion to the Onefour area. Ian Walker, ranch manager for the Dominion Experimental Farm, will again provide access to the Upper Cretaceous badlands located on the farm. Exposures of the Oldman Formation will be the focus of our trip, although sites in the Dinosaur Park and Foremost Formations may also be visited. The Oldman Formation has produced a variety of both micro- and macro-vertebrate fossils, including dinosaur teeth, champsosaur vertebrae, fish remains, egg shell fragments and, rarely, dinosaur skeletons. As this general area is seeing renewed interest by the Royal Tyrrell Museum, finds of scientific importance will be documented and reported.

Day 2: Sunday, June 24, 9:00 A.M. (note—1 hour earlier than Saturday)

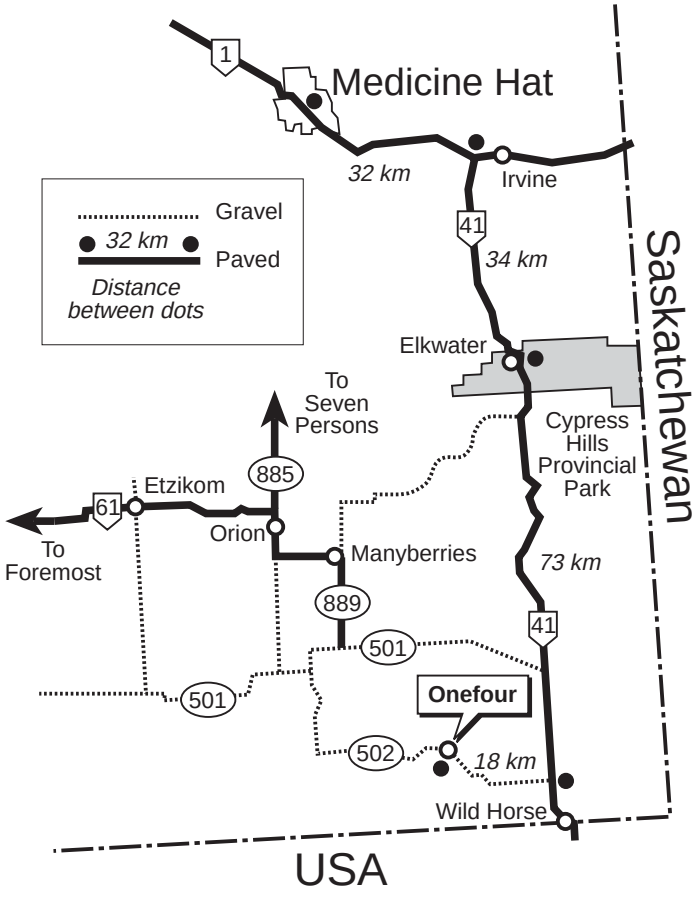
Same meeting place. On Sunday, we will explore a different valley on the farm.

Accommodations

As with all APS trips, accommodations are the responsibility of participants. The best motel accommodations are in Medicine Hat (approx. 2 hours from Onefour). Contact **www.explorealberta.com** for Alberta's accommodations guide. Campgrounds are located in Medicine Hat (Gas City, 403-526-0644), Cypress Hills Interprovincial Park (**www.cypresshills.com**, 403-893-3835) and an improved campground in Foremost (Wayside Campground, 403-867-3733).

Driving conditions

Allow at least 5 hours to drive from Calgary. Perhaps the easiest route is to take the Trans-Canada Highway through Medicine Hat, turn south on highway 41 through the Cypress Hills and then turn west on #502 (gravelled), 18 km to Onefour (total distance 157 km from Medicine Hat). It is essential that everyone bring extra gasoline, as there is a distinct lack of service stations in this area (nearest reliable public gas stations are in Foremost or Medicine Hat; less reliable possibilities are Manyberries, Elkwater, and Irvine, on the Trans-Canada Highway). Graded gravel roads will be encountered as well as short distances on relatively flat dirt roads. Bring plenty of water too—this area can get very hot (even in June).



Cost

$5.00 per membership; **due before June 1**. There is no attendance limit for this trip.

Fernie-Sparwood, B.C
July 20–21, 2002 (Saturday & Sunday)

Day 1: Saturday, July 21, 9:00 A.M.

Meeting place: Fernie Aquatic Centre parking lot, Fernie, B.C (located on the south side of town, on Pine Avenue, approx. one block east from intersection with Coal Creek Road.

Guy Santucci, our guide for last year's trip to the Cranbrook area, is leading us to several Jurassic and Lower Cretaceous flora sites in the Fernie–Sparwood area (similar to the APS trip to Grassy Mountain in June 1998). On Day 1 we will visit sites on the outskirts of Fernie, so it's best to make accommodation arrangements there. Although material can be surface-collected, a variety of chisels and hammers are recommended as some of the host rocks are silicified.

Day 2: Sunday, July 22, 9:00 A.M. (note the different meeting place)

Meeting place: Tourist Information building, Sparwood, BC, near the corner of Highway 3 and Red Cedar Drive. You can't miss it—the world's largest truck, the "Terex Titan" (used in coal mining) is part of the display. Sites along Highway 3, near Sparwood, will be visited. Due to limited parking along the shoulder of Highway 3, car-pooling is a must and will be enforced for safety reasons. The trip may conclude with a tour of the Elkview coal mine. If time permits, a popular Palaeozoic coral locality and a Cretaceous mineral collecting locality, both near Coleman, AB, may be visited on the return drive to Calgary.

Accommodations

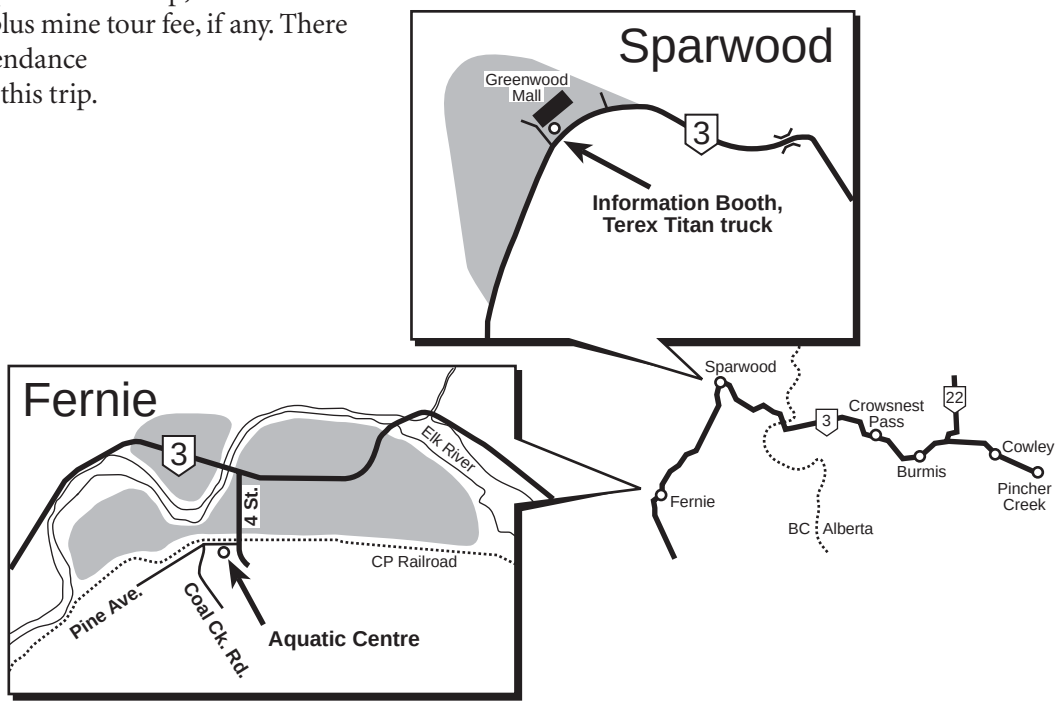
For more information on accommodations contact Fernie Tourism at 1-888-754-7325 or **www.fernietourism.com** and/or **www.fernieguide.com**. Camping is available at Mount Fernie Provincial Park (1-800-689-9025). For more information on Sparwood contact their chamber of commerce at (250) 425-2423 or **www.sparwood.bc.ca**, or the Sparwood Municipal Campground, at (250) 425-7815.

Driving conditions

Fernie is 302 km from Calgary, and 32 km south of Sparwood. Allow at least 4 hours driving time from Calgary to Fernie. Minor stretches of gravel road will be travelled during the trip; a 4x4 is not required.

Cost

$5.00 per membership; **due before June 1**, plus mine tour fee, if any. There is no attendance limit for this trip.



August (15), 16, 17 & 18, 2002 (dates are subject to change)
Little Rocky Mountains, Zortman, Montana

APS past-president Wayne Braunberger will help lead this trip into the Little Rocky Mountains southeast of Havre, Montana. The Little Rockies were formed when intrusive igneous rocks pushed upward into the overlying older sediments. Subsequent erosion has yielded not only exposures of gold-bearing igneous rocks, but Mississippian, Jurassic and Cretaceous-aged formations, containing a variety of marine invertebrate fossils (corals, brachiopods, crinoids, belemnites & ammonites). This unique occurrence, in the middle of the prairies, has served as a training ground for geology students from the University of Saskatchewan.

Wayne has up to four days of activities proposed (2 days at Jurassic-Cretaceous sites, 1 day at Mississippian sites and 1 day of mine tours and igneous geology). However, before final dates and activities are formalized, we would like to know the interest level of participants. First, how many APS members (and their family members) are interested in a 3-day trip (minimum length)? Or 4-day trip? Please use the sign-up sheet to place your vote.

Final details, at the latest, will be published in the June issue of the Bulletin.

Accommodations

The APS may book group accommodations at a trailer park and/or campground in Zortman. Several of our members have stayed there in the past and were pleased. More info to follow.

Important Information

Passports are now essential for crossing the US-Canadian border (including for children). Parents: If you are crossing the border with your children, but without your spouse—you now need a letter, signed by your spouse, giving his/her permission to travel with your children in his/her absence (this stems from parental abductions). Several border crossings now require this letter. Do not take the border crossing lightly—plan ahead.

Driving Conditions

Zortman is a 7 hour drive from Calgary without delays. However, plan for delays at the border. Paved highway conditions between Calgary and Zortman. A variety of paved, gravel and dirt roads will be used in the Zortman area. Car-pooling will be encouraged at Zortman.

Cost

$5.00 per membership; **due before June 1. A down-payment for group accommodations may be required before June 1 as well** (details to follow). Mine tour fees are extra. There is no attendance limit.

Questions?

For more information on all field trips, contact
Keith Mychaluk, APS Events Coordinator
(403) 228-3211, or email: **events@albertapaleo.org**

(***Reviews*** *— continued from Page 17*)

of the rare fossil teeth. The intention in 2002 is to dig deeper into known sites and survey new regions with the knowledge that there are huge areas left to look at. There are further notes and references to read relating to DNA structures of modern mammals such as rodents, lemurs, carnivores and tenrecs to aid in the consideration of theories of evolution and dispersal of species over a 160 million year period.

How the West was Swum

by Richard L. Orndorff, Robert W. Wieder and Harry F. Filkorn. Natural History, June 2001, p. 22 – 25.

Richard L. Orndorff is assistant professor of geology at the University of Nevada, Las Vegas. Robert W. Wieder is a biologist at the California Department of Agriculture and Harry F. Filkorn is a palaeontologist at Kent State University in Ohio.

The state of Nevada has adopted *Shonisaurus* popularis as its state fossil. Union Canyon, 37 kilometres east of Gabbs, Nevada, was designated the Ichthyosaur Paleontological State Monument in 1955 and renamed Berlin Ichthyosaur State Park in 1970.

Triassic ichthyosaurs, more than 200 million years ago had high, streamlined bodies resembling swordfish, marlin and tuna, but had to surface to breathe air and to give birth to young. Their elongate mouth and strong jaws held rows of pointed, conical teeth, similar in shape to those of modern toothed whales. A circular set of overlapping bony plates internally reinforced the disproportionately large eyes and compensated for changes in water pressure when these animals dived or surfaced.

Triassic Luning Formation ichthyosaurs are scattered throughout the mountain ranges of central Nevada in the West Humboldt and New Pass Ranges. Union Canyon specimens were known in 1928 and the first expedition took place in 1954. Thirty-seven mostly complete skeletons are known, with nine now on view. The specimens are the remains of a single species. Large individuals had 2 metre-long front fins, 7.5 metre- long tails and 3 metre-long skulls.

The enclosing rocks indicate a deep-water environment with the occurrence of ammonoids, nautiloids, corals, echinoderms and sponges. The *Shonisaurus* bones are in the correct anatomical position relative to one another, with brachiopods on top. A possible death scenario is that the ichthyosaurs ate fish or shellfish or plankton tainted with a neurotoxin that paralyzed them. Then they perished.

Each new generation of palaeontologists builds on the work of those who came before, providing some answers but invariably providing more questions. ❑