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Book Reviews / Critique

BOOK REVIEWS

GeoMap Vancouver Geological Map of the Vancouver Metropolitan Area

Produced by Robert J.W. Turner, John Clague, Bertrand J. Groulx and J. Murray Journeay
Geological Survey of Canada
Open File 3511
1998, poster, $15.00
Available from GSC Publication Office
101-605 Robson Street
Vancouver, British Columbia V6B 5J3
(604) 666-0521
Cette publication est aussi disponsible en français.

Reviewed by Ward Neale
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Calgary, Alberta T2L 1G2

This unique map is a sequel to a preceding poster, *Geoscape Vancouver.* Both have been described in a colourful and comprehensive article by the authors and the poster has been favorably reviewed by Nat Rutter in earlier issues of this journal. Now that *GeoMap Vancouver* is available and reportedly selling briskly to the local clients for whom it was designed, is there any need to review it for those unfortunate enough to dwell elsewhere on our continent? The short answer is "Yes" and the reason: "go thou forth and do likewise."

The poster preceded the map, according to the authors, in order to define the geoscience issues most relevant to those living in the area. It consists of a central satellite image of the Squamish and lower Fraser River areas which is surrounded by 10 panels with catchy titles. These deal with floods, volcanoes, the mountain corridors and their hazards, earth resources, and similar topics. All are tied in to the interests and concerns of the area residents.

GeoMap Vancouver provides the back-up data to these interests and concerns. In the words of the authors: "This area is underlain by diverse geological materials with different physical properties. The purpose of the map is to show the surface distribution of these materials and to summarize material characteristics that are relevant to engineering, the environment and land-use planning."

A geological map at approximately 1:100,000 scale forms the centrepiece of a poster sheet measuring 154 x 91 cm., the same size as the Geoscape poster. An irregular rectangle, with the 49th parallel as its southern border, the map includes the Fraser River valley with its flanking uplands and mountains from Agassiz and Chilliwack in the east to the delta edge at the Strait of Georgia in the west. The northern boundary of the map is stepped up to include the Burrard Inlet and the urban districts of North and West Vancouver. Geology is depicted in nicely contrasting colours draped over a shaded-relief topographic surface. All major thoroughfares and even secondary roads (in rural areas) are shown in a clearly visible but unobtrusive off-white that allows local users to accurately locate their immediate communities if not to pinpoint their actual residences.

The uniqueness of *GeoMap Vancouver* is in the choice of map units. The authors have recast the units on existing surficial and bedrock maps to produce a legend of new lithologically based units. The three major divisions are: Bedrock in the Mountains (map-units II-I4), Ice-Age Sediments in Uplands (6-I0), and Modern Sediments in Lowlands (I-5). The text description of each unit contains a minimum of jargon and a packsack full of useful information. Thus it is explained where Sand and Gravel (map-unit 8) occur in the area, that these materials have a high bearing capacity and provide excellent drainage. They are also important sources of aggregate. However, shallow aquifers within them are vulnerable to contamination from agriculture and industry. Peat (2) is described and located and it is noted that several bogs have been mined for sphagnum peat moss and that peatlands of the delta are great producers of blueberries and cranberries.

Two photographs, 6.0 x 4.5 cm, illustrate each map-unit, one a landscape and the other a close-up. These are very effective: modern rubber boots (Wellingtons?) half submerged in modern clayey silt (3) leave no doubt as to its bearing capacity; Tsawwassen residences precariously balanced on a cliff of steepland sediments (I0) above another row of residences on the sea beach immediately below prove that mankind rates a view above a risk; and a well-known westcoast outdoors person provides an attractive scale for a spectacular outcrop of basalt (II).

Above the main map is the title *GeoMap Vancouver;* then a short text block outlining the content of the map; a list of authors and acknowledgment of contributers. To its right are: a satellite image of southwestern British Columbia upon which a shaded relief image of the map-area has been imposed; a small map showing the three major physiographic elements of the map-area (to which the three major divisions of the legend are related); and a simple block diagram illustrating the relationship of the geology on the main map to that in the subsurface. A list of basic references is provided for those who

require additional information.

Below the main map are five mini-maps. One is a map of the entire BC coastal area delineating probable zones of differing earthquake ground motions. Because of its scale, it isn't particularly edifying except to suggest that the Vancouver area is in a middle risk zone. Also, its explanatory note may be well beyond the comprehension of some teachers and their students.The other four mini-maps treat Earthquake Liquefaction, Flood Hazards, Slopes and Landslides, and Groundwater Aquifers. Each mini-map illustrates grades of risks or, in the case of aquifers, the degree of vulnerability. Again the road system is well depicted, despite the downscale, and aids in location of specific areas. A possible criticism of all these mini-maps is that they emphasize hazards more than the bountiful resources of the Vancouver region. However, clear descriptions of hazards and ways to avoid them are a major service to a nation where opinion polls (even in Calgary) show that interest in health and longevity surpasses that in almost all other topics. Maybe the cliff-dwellers in Tsawwassen represent an exception to this Canadian norm!

GeoMap Vancouver should find a place to hang beside its sister poster *Geoscape Vancouver* in every school in the metropolitan region and the lower Fraser River valley. In addition, it will be welcomed by engineers, planners and other professionals. Maybe it will be appreciated most of all by the general public: the little guys who need ammunition to stave off the real estate sales people who attempt to settle them in neat little split levels on lowland sediments that are prone to earthquake liquefaction.

If you are into communicating geoscience elsewhere in the country, this is an act to follow. Don't be daunted by all the mountains, cliffsides, blueberries and earthquake threats that Shangri-La has to offer. Think instead of the threats and promises geoscience holds for the citizens of St. John's, Halifax, Quebec City, Montreal and even the placid, grey areas between there and here, and then go for it. *GeoMap Moosejaw* could be a triumph.

Finally, hats off to the GSC and its employees and former employees who produced and published this enlightening document and made it available for only 15 Canadian loonies per copy. It is 1998's best buy!

Urban Geology of Canadian Cities

Edited by P.F. Karrow and O.L. White
Geological Association of Canada
Special Paper 42
1998, 500 p., $144 Cdn/$120US

Reviewed by Stephen C. Hollingshead and John F. Gartner
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This impressive, hardcover book has two basic themes, one which you expect, and the other which you don't.

The theme that you expect is implied by the title and the cover: this is a comprehensive reference text on the geology, geotechnics, hydrogeology, earth resources, and construction issues of 23 Canadian cities. It is well organized and easy to use (although the high-gloss paper stock that gives the book its quality feel is annoyingly reflective in almost any light). The editors have done an excellent job of ensuring that the articles, each dealing with one city and written by local authorities on the subject, follow a similar structure and cover the same basic information. Yet, despite the common format, local flavour shines through in almost every one, as typified by the story of how Sudbury, Ontario got its name (named after the birthplace of the wife of the superintendent of construction for the Canadian Pacific Railroad).

"Comprehensive" refers to the geographic coverage — since most of the major Canadian cities and physiographic regions are represented here — but not necessarily to the depth of the information presented. To paraphrase one of the authors, "This is a text that someone new to any of the cities would use as an introduction, an overview, but not as a detailed data source." However, many of the articles contain extensive reference lists that would help serve that purpose, and in themselves are well worth having.

Experienced practitioners in any of these cities likely will be familiar with most of the local information already; nevertheless, work boundaries are disappearing and many of us find ourselves involved in projects across the nation. And thus, one of the great benefits of this book is the description of the local conditions that are contained in most chapters. The chapters describing Victoria and Vancouver — the two major cities in the Canadian Cordillera — emphasize the natural engineering geology hazards that face the citizens of these cities. Edmonton, Calgary, Saskatoon, Regina and Winnipeg — the cities of the Great Canadian Plains — all have problems with the rivers that flow through them, be it flooding, or stability of the river banks, and, in many cases, problems with clay soils; these problems are well discussed in the text. The cities that lie within the Precambrian Shield have problems associated with resource development, and these issues are adequately dealt with, as illustrated in the Urban Geology of the City of Sudbury. Heading further south to the Great Lakes and St. Lawrence Plateau, all of the urban centres, including the major cities of Toronto, Ottawa and Montreal, have excellent discussions on the engineering geology problems of urban expansion. These discussions may be a description of tunnelling problems for subways, the management of geological engineering information, or the significance of the hydro-electrical development of the Niagara region. Finally, local issues in the Appalachian Region are discussed, in the cities of Canada's Maritime provinces, as typified by the water quality problems of Halifax Harbour.

The second theme of the book is not advertised by its title or cover, yet it is in fact equally compelling. It is a not-so-subtle plea for the resurrection of urban geology data bases across the country. The Preface and the introductory articles, one by J.S. Scott and one by the editors themselves, provide an overview of efforts dating all the way back to the last century to compile centralized records of geological and geotechnical data in cities across Canada, with the last major project being spearheaded by the Geological Survey of Canada in the early 1970s. Each of the subsequent articles also includes a short discussion of the status of these data bases in their respective cities. With a few notable exceptions, the most common fate appears to be disuse and neglect. The editors, and many of the authors, conclude that these centralized data bases are needed, and that someone, possibly the individual municipalities, must step forward and put the nec-

essary funding and administration behind them.

While the main purpose of this book was not to tackle the data base issue in a comprehensive way, the editors and authors certainly have opened the door on a debate that should be taken up vigorously in the geoscience community. We can't expect that our politicians at any level of government will make such a decision and champion that cause alone.

Finally, in summary, we can't think of a better text to read as we fly to a new project site in one of these cities, or on vacation, for that matter.

A Colour Illustrated Guide to Sedimentary Textures Cold Cool Warm Hot

By C. Prasada Rao
Carbonates
10 Lorne Crescent
Howrah, Tasmania 7018 Australia
1997, 128 p., softcover
US$50.00 plus US$10.00 for handling and postage by economy air

Cool-Water Carbonates

Edited by Noel P. James and Jonathan A.D. Clarke
Society for Sedimentary Geology
Special Publication 56
1997, 440 p., hardcover
US$79.00 (member)
US$111.00 (non-member)

Reviewed by Frances J. Hein
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Perhaps the question is: why ask a clastic sedimentologist to review two books with a fair amount of non-clastic coverage? Perhaps the reason is that I started out in graduate work on reef carbonates, and continued on deep-water resedimented carbonates, although I have not primarily kept up in these fields of sedimentary research. At any rate, it looked interesting to me to delve into the latest in sedimentary research concerning depositional temperatures, particularly concerning non-clastics, and to learn of the latest findings. In addition, I chose to compare/contrast two titles, one of which is self-published in Australia, whereas the other is one of the Society for Sedimentary Geology (SEPM) Special Publication series.

The first book, *A Colour Illustrated Guide to Sedimentary Textures cold cool warm hot,* is self-published by Dr. C. Prasada Rao of the Department of Geology, University of Tasmania, Australia. It is a very interesting compendium of a variety of sedimentary rocks with indicators of temperatures at the time of deposition. The book is beautifully illustrated by 54 colour plates, with very good colour separation, printed by the government printing office in Tasmania. The colour plates include textures indicative of various depositional temperatures, ranging from cold (<10° C), cool (10-25° C), warm (25-50° C) and hot (>50-250° C). The plates include field, SEM, petrographic and cathodoluminescence photographs. Most types of sedimentary rocks are included in this discussion, ranging from glacial diamicts and tillites through glacial and non-glacial clastics; volcaniclastics; carbonates; and evaporites, phosphorites and banded ironstones.

Preceeding the colour plates is a brief text summary of the sedimentological and isotopic characteristics of various sediments from different environments spanning the depositional temperatures, and the diagenetic and hydrothermal processes of alteration that have affected these rocks.

The text is clearly written, at an introductory level, suitable for undergraduate, graduate and post-graduate work. Black and white illustrations in the text are good to very good, and the colour plates are excellent. Some of the colour plates are from the author's own work, whereas others have been incorporated from previous publications by the American Association of Petroleum Geologists, Elsevier, Northeast Science Foundation, and the SEPM. A standard key is used for each of the colour plates, and plates for each rock type are arranged in order from cold to hot, allowing easy comparisons of the same sedimentary rock type formed at different temperatures.

The premise of this book is interesting and should be of use to explorationists involved in the search for hydrocarbon and mineral resources. Although it is debatable that some of the textures described and illustrated are significantly influenced by the depositional temperature, I highly recommend this book for anyone involved in trying to interpret sedimentary textures, regardless of the depositional temperature of formation. Although book prices have skyrocketed in the last few years, at the price of US$50, given the excellent illustrations and plates, I think it is a good buy.

The second book, *Cool-Water Carbonates,* edited by Dr. N.P. James and Dr. J.A.D. Clarke, arose out of an international workshop on cool-water carbonates, hosted in Australia. As with the first book, this is a very interesting collection of scientific papers, in this case dealing with deposition of carbonates under cool-water conditions, that is on continental shelves and offshore banks under oceanic conditions of cool to cold depositional temperatures. The collection of papers deals with Modern (nine), Tertiary (seven), and Mesozoic/Paleozoic (seven) environments. Of the modern settings, six are from Australia, and one each from New Zealand, northern Norway, and the Barents Sea. Tertiary studies include five from Australia; one from the Island of Rhodes, Greece; and one from southeastern Spain.

Mesozoic and Paleozoic settings examined were more global, including studies from Denmark, the margins of the Mediterranean Tethys, Svalbard, western Barents Sea, the Arctic and Western Canada, and the Appalachians of North America.

This SEPM publication fits the high standards of all of the "red-covered series" of SEPM Special Publications. It is very well edited, and has consistent style, with a high level of scientific investigation and rigour.

Most of the illustrations are gray-tone or black and white, but with good font styles and sizes to the graphics, and good tonal contrast to the photographs. The exception is one graphic cartoon, that probably did not need colour definition to get the points across. Text is clear to read, and gives a wide breadth of features, despite the fact that most of the studies are from Down Under. Although James and Clarke assess the current collection of papers as bringing together studies in a field that is in its "mid-life" of study, it is neither staid nor

pedestrian. In fact, I would state that the emphasis on the cool-cold water spectrum of carbonates is more at a "twenty-something" stage of development rather than "middle-age," and still has the vigour and interest, with new results coming to the forefront. Although I am not very good at proofreading, I did not detect any grammatical or typographical errors. The text is consistently clear to read and very comprehensive. The references at the back of each paper provide a good starting point for those wishing to research further a particular area. I do have one reservation, and that is the lack of a coherent overview of all of the disparate papers in the collection. James does write an overview of the cool-water carbonate depositional realm, but the emphasis is mainly on modern environments. Although these examples provide good analogues for ancient successions, it would be an advantage to have had the modern papers compared and contrasted more explicitly with the ancient studies presented in the last two sections of the publication.

At the SEPM non-member price of US$111.00, this book is expensive, especially for potential Canadian purchasers. However, given the wide breadth of aspects covered in this compilation, and despite the fact that it was focussed on Australian studies, it is an excellent collection. It is to be hoped that it will give many of us the incentive to eventually go Down Under ourselves to see the "largest region of cool-water carbonate" on Earth. The editors of this publication, along with Peter Scholle as Editor of Special Publications for SEPM, should be congratulated on a job very well done in bringing to the public a topic of current and continuing interest.

Ecoregions. The Ecosystem Geography of the Oceans and Continents

By Robert G. Bailey
Springer-Verlag, New York, Inc.
1998, 176 p., US$39.95, paperback

Reviewed by David H. McNeil
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As geologists, we have a deep understanding of the climatic and geographic history of the earth, and to a significant extent its ecological history, but our knowledge of present day ecosystems is often piecemeal and learned on an *ad hoc* basis. *Ecoregions* may help those that are looking for an introductory global overview of the world's current ecoregions, but don't want to be burdened with complex details of oceanography, climatology, soil science, botany, zoology, *etc.* The book provides easy access to the geographic distribution, characteristics, and processes operating behind every major ecosystem in the world.

Ecoregions are defined as geographic areas characterized by large-scale, predictable patterns of climate and geography that result in predictable associations of animals and plants. Bailey's ecoregion classification draws from traditional classifications of the ocean by Dietrich (1963), of the continental climates by Köppen (1931) and Trewartha (1968), and of the climate-vegetation landscapes of Gerasimov (1964). Bailey has divided the world into three oceanic domains and four continental domains, which are further divided into 14 oceanographic divisions and 30 continental divisions. It is the descriptions of these 44 ecoregions that constitute the core of this book.

The descriptions are clearly and simply written in textbook style so that the book is suited to an introductory academic or technical level. Each ecoregion is described in terms of interconnected relationships between physical geography, climate and the effects on faunas and floras. Technical jargon is highlighted and explained appropriately. Brief appendices provide summary information on air masses, frontal zones, common and scientific species names, conversion factors, and a glossary of technical terms.

The book contains 106 illustrations that are models of clarity and effective use of colour graphics. The book is an excellent source of graphs, profiles, maps and photographs illustrating the world's major ecosystems, but the photographs are moderately biased toward the United States. The text maps illustrating the distributions of the ecoregions throughout the world are visually appealing but rather small scaled. On a world map about 10 cm across, it is difficult to position any specific geographic locality. Two larger-scaled maps are included as enclosures, but at a scale of approximately 1: 78,700,000, these also provide only a general pattern of ecoregion distribution. Political divisions and internal geographic features of the continents are not shown. References to more detailed maps, however, can be found in the selected bibliography.

Bailey extols the ecoregion concept as a tool for environmental planners and others in ecology, conservation, forestry, land use, biogeography, *etc.* and has published numerous articles on the topic since 1976. He credits John Crowley, Université Laval, as his original influence in the field of ecoregions (*Canadian Geographer*, 1967, v. 11, p. 312-326). The concept shows that ecoregions typically cross over political and jurisdictional boundaries and are repeated throughout the world wherever similar conditions of geography and climate exist.

Ecoregions does not directly assess our immediate concerns about how our ecoregions are changing under the relentless influence of man and climatic change, but it does provide a thorough description of current ecosystem distributions and characteristics, and therefore provides us with an objective backdrop *vis-à-vis* the concerns of global connectedness.

Roadside Geology of South Dakota

By John Paul Gries
Mountain Press Publishing Co.
Missoula, Montana USA
1996, 358 p., US$20.00

Geology Underfoot in Death Valley and Owens Valley

By Robert P. Sharp and Allen F. Glazner
Mountain Press Publishing Co.
Missoula, Montana USA
1997, 321 p., US$16.00

Reviewed by William A.S. Sarjeant
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For the geologist visiting the United States, whether on serious research or as a tourist, the two series of guides published by Mountain Press are as valuable nowadays as the Baedeker guides used to be for visitors to Europe. There are now 18 *Roadside Geology* volumes, covering 19 of the 50 American states. (Vermont and Hew Hampshire are treated in one volume.) Three works have appeared so far in the even more detailed *Geology Underfoot* series. All are a pleasure to read and to use; the text is well printed and lucid and the illustrations abundant, while the provision of sketch maps of particular localities usefully supplements the text.

In the South Dakota volume, the road maps are printed in two colours, enhancing their clarity. The illustrations comprehend minerals and fossils, as well as outcrops; the fossil duck eggs from the White River formation especially caught my eye. I have yet to visit that state but, when I do, I'll have this book firmly in hand!

I have visited California many times, but not yet the two valleys that are the subject of the second volume here considered. (I got closest to Death Valley in 1968, but that was in high summer and my wife refused to risk our small daughter and herself in so hazardous a place!) The phenomena of erosion and deposition in so arid an environment are a principal theme and abundantly illustrated; this is underscored by the somewhat quirky chapter titles: An Intrepid Explorer (the Mohave River), Nature's Crafted Mosaics and the Tanning Process, The Sailing Stones of Racetrack Play, *etc.* Would the maps prove adequate for the geological explorer? To my eyes, they appear oversimplified. However, since I've not tried to use them on location, I can only wonder and look forward to doing so!

Peri-Tethys Memoir 3. Stratigraphy and Evolution of Peri-Tethyan Platforms

Edited by Sylvie Crasquin-Soleau and Eric Bararier
Mémoires du Museum National d'Histoire Naturelle
Tome 177
Paris, France
1998, 264 p., 260 FF
approx. Cdn$71 (98-11-16)
English with French abstracts

Reviewed by Benoit Beauchamp
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This volume is the third installment in a series of publications resulting from the activities of the Peri-Tethys Program, an industry-sponsored European geoscientific endeavour aimed at examining the influence of Tethyan evolution on the bordering cratons from its birth (through the break-up of Pangea), its life (extension and formation of oceanic seaways) to its death (collision and inversion). The *Peri-Tethys Memoir 3* is a collection of 13 papers broadly subdivided into two groups: nine papers about the so-called Northern Platform (Ukraine, Russia, Black Sea, *etc.*) and four papers about the Southern Platform (Northern Africa).

As a whole, this volume is a mishmash of everything (paleontology, sedimentology, stratigraphy, structural geology, tectonics, paleomagnetism, *etc.*). Upon browsing through the book one gets the feeling that the Peri-Tethyan Program is an umbrella for just about any European-North African research. In that respect, the book suffers from the lack of an introductory page. What is the Peri-Tethys Program? Is the book the proceedings volume of some sort of conference (as it seems to be)? What are the previous accomplishments of that Program? *etc.* Other than a four-line paragraph that introduces the Program on the back cover of the book, and the coloured logos of the sponsoring organizations, one is left with more questions than answers about the nature of the Peri-Tethys Program. I imagine that many of these answers are obvious to European scientists, but certainly not to researchers on this side of the pond.

That being said the book contains a few gems, which may make the book appealing enough for some people with particular interests to want to buy it. Along those lines, the best papers are those that centre around understanding the structural and kinematic evolution of parts of the Peri-Tethyan platform. Worth mentioning are the papers by: Frizon de Lamotte *et al.*, "Structural inheritance and kinematics of folding and thrusting along the front of the Eastern Atlas Mountains (Algeria and Tunisia)"; Bouaziz *et al.*, "Tectonic evolution of the Southern Tethyan margin in Southern Tunisia"; Bergerat *et al.*, "The Moesian Platform as a key for understanding the geodynamical evolution of the Carpatho-Balkan alpine system"; Hippolyte and Sandulescu "Neogene evolution of the Carpathian foothills: insights from the Romanian diapir fold area"; Saintot *et al.*, "Reconstruction of paleostress fields in Crimea and the North West Caucasus, relationship with major structures"; and the two papers by Nikishin *et al.*, "Scythian Platform: chronostratigraphy and polyphase stages of tectonic history," and "Scythian Platform, Caucasus and Black Sea region: Mesozoic-Cenozoic tectonic history and dynamics."

Far less appealing are the unequal contributions that revolve around sedimentologic and stratigraphic studies. The paper by Sagri *et al.*, "New data on the Jurassic and Neogene to Quaternary sedimentation in the Danakil Horts and Northern Afar Depression, Eritrea" probably constitutes the best contribution in that category. The contribution by Izart *et al.*, "Stratigraphy and sequence stratigraphy of the Upper Carboniferous and Lower Permian in the Donets Basin" which, undoubtedly hovers near the limits of the Peri-Tethys Program, adds to the recently gener-

ated wealth of data (through a Europrobe Project) on that elongated rift of Ukraine. The contribution by Salem *et al.*, "Triassic series on the Saharan Platform in Algeria; Peri-Tethys onlaps and related structuration" is a poorly documented (mostly an isopach map analysis) study of a vast region of Algeria. Equally uninformative, poorly documented and dreadfully descriptive is the paper by Molostovsky *et al.*, "Stratigraphic correlations of the Upper Permian and Triassic beds from the Volga-Ural and Cis-Caspian".

Standing alone in the pack are two contributions that appear out of place: one by Lemaire *et al.* "Paleomagnetism of Permian to Jurassic formations from the Turan Plate," a paleomagnetic study with the far reaching conclusion that a major shortening zone between Iran, Turan and the stable Eurasian plate might exist somewhere north of the Caspian Sea; and finally one by Vishnevskaya "The Domanikoid facies of the Russian Platform and basin paleogeography," which attempts to draw comparisons between the famous Devonian Domanik source rock of the Caspian-Ural belt and a seemingly similar Jurassic deposit. The bulk of this paper is in fact a taxonomic study of Jurassic radiolarians.

In summary, this book is a very unequal attempt at providing its readers with new and exciting information of the Peri-Tethyan Platforms of Europe and North Africa. The content is spread too thinly over too many topics. The seven papers that centre on the structural and kinematic evolution of the platforms in question constitute a core of data and information solid enough to entice potential buyers enthralled by that topic. The rest of the book is pretty fickle, both in terms of quality and content. At Cdn $70.00, give or take, one can hardly recommend buying this book.

Taxonomie des petits foraminifères du Carbonifère supérieur-Permien inférieur du bassin de Sverdrup, Arctique canadien

Par Sylvie Pinard et Bernard Mamet
Palaeontographica Canadiana 15
1998, 253 p.
Cdn$72.50 (orders from within Canada)
US$72.50 (orders from elsewhere)
Available from GAC

Reviewed by John R. Groves
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Les spécialistes des foraminifères de même que tous ceux et celles qui s'intéressent à la géologie du Paléozoïque dans l'Arctique attendaient avec impatience la publication du présent volume. Il est, pour l'auteure principale, l'aboutissement de travaux de doctorat terminés en 1989 à l'Université de Montréal. De façon absolue, il s'agit de la plus ambitieuse étude entreprise dans ce domaine en Amérique du Nord depuis des décennies.

Comme le laisse transparaître son titre, le volume se concentre sur la systématique, les sections consacrées à la description du contexte géologique, de l'évolution des familles, de la paléobiogéographie et du paléoclimat étant brèves. Les interprétations biostratigraphiques sont données dans le cadre du controversé schéma de zonation de Mamet. La plus grande lacune du travail se situe dans l'omission généralisée des détails sur la position stratigraphique, les sites d'échantillonnage et les occurrences, ce qui aurait permis aux lecteurs(trices) d'analyser indépendamment la répartition des taxons récoltés. Tout(e) biostratigraphe sérieux(se) sera frustré(e) de constater que les occurrences fossilifères sont présentées selon leur âge interprété plutôt que selon leur position dans un coupe stratigraphique mesurée.

L'une des grandes forces du volume s'avère l'abondance des synonymies, des descriptions taxonomiques et des références, mais aussi la grande qualité des planches. Les auteurs ont pratiquement consulté l'ensemble des travaux systématiques sur les fossiles à l'étude. Les assemblages du Pennsylvanien précoce et moyen présentent des affinités tant avec les royaumes fauniques de l'Eurasie que de l'Amérique du Nord subarctique. L'existence de la plupart des taxons était connue, mais le fait de signaler leur présence dans le bassin de Sverdrup constitue un indice paléobiogéographique d'importance pour les travaux de nature phylogénétique et biostratigraphique.

Les «petits» foraminifères du Pennsylvanien tardif et du Permien précoce sont moins bien connus et ce, à l'échelle internationale; ils n'ont pratiquement pas été étudiés en Amérique du Nord pendant les 60 années qui ont précédé les travaux de doctorat de l'auteure principale. Voilà donc l'essence même de la contribution des auteurs. Ce volume (tout comme un extrait publié de la thèse de l'auteure principale) contient la description d'une nouvelle famille, de huit nouveaux genres et de nombreuses nouvelles espèces. Les auteurs, en étudiant les «petits» foraminifères du Pennsylvanien tardif-Permien, se sont non seulement penchés sur un sujet de recherche non exploré, mais sont aussi tombés sur une faune qui revêt une importante en soi puisqu'elle contient les ancêtres de la radiation au Mésozoïque de Lagenina. À l'opposé, les fusulinidés, qui ont été étudiés plus en profondeur, ont connu l'extinction avant la fin du Paléozoïque.

Ce volume est le fruit d'un imposant travail et d'une tenacité remarquable. Tout bien considéré, les points forts l'emportent sur les points faibles. Bien que toute personne intéressée à la paléontologie devrait y jeter un coup d'oeil, il ne fait pas de doute que ce volume deviendra une référence indispensable pour quiconque étudie la géologie de l'Arctique ou les foraminifères.

Specialists on the Foraminifera and others interested in Paleozoic geology of the high Arctic eagerly have awaited the publication of this volume, which is the culmination of doctoral research completed in 1989 at Université de Montréal by the senior author. In terms of sheer scope, this is the most ambitious North American work in its field in decades.

As suggested by its title, the volume is largely systematic in nature, with only brief sections on geologic setting, fam-

ily-level evolutionary relationships, paleobiogeography, and paleoclimate. Biostratigraphic interpretations are given within the context of the controversial Mamet zonation scheme. The most serious deficiency of the work is the wholesale omission of detailed stratigraphic, sampling, and occurrence records which would enable readers to analyze independently the distribution of recovered taxa. Serious biostratigraphers will be frustrated by fossil occurrences reported in terms of their interpreted age and not according to their position in a measured, stratigraphic section.

An obvious strength of the volume is the wealth of information in the synonymies, taxonomic descriptions, bibliography, and high-quality plates. The authors have considered virtually the entire body of systematic literature on the subject fossils. Assemblages of Early and Medial Pennsylvanian age exhibit affinities to both the Eurasian and sub-Arctic North American faunal realms. Although most taxa were known previously, their documented presence in the Sverdrup Basin provides critical paleobiogeographic evidence for phylogenetic and biostratigraphic research.

Late Pennsylvanian and Early Permian smaller foraminifers are less well understood internationally, and had been ignored in North America for 60 years prior to Pinard's doctoral research. These are the basis for the authors' most meaningful contributions. This volume, along with a previously published excerpt from Pinard's dissertation, contains descriptions of one new family, eight new genera, and a large number of new species. Not only have the authors plowed fertile new ground here, but the Late Pennsylvanian-Early Permian smaller foraminiferal fauna has intrinsic importance, for it contains the ancestors to the Mesozoic radiation of the Lagenina. In contrast, the more thoroughly studied fusulinaceans became extinct before the close of the Paleozoic.

This volume is the product of impressive labour and tenacity. On balance, its merits outweigh its shortcomings. Whereas it deserves a look from anyone interested in paleontology, it will become an indispensable reference for all who study Arctic geology or the Foraminifera.

(Translation of this review provided by Palaeontographica Canadiana.)

Charles Doolittle Walcott, Paleontologist

by Ellis L. Yochelson,
Kent State University Press, Kent, Ohio and London, England
1998; 510 p., US$49.00

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Charles D. Walcott was an intellectual giant of the late 19th and early 20th centuries. Self-taught in geology after high school, his scientific discoveries were lauded internationally, he was recognized as a creative developer of government scientific policy in the United States, and honoured for his extremely effective organization of the production of US military aircraft during the First World War. Today, he is most renowned for his scientific achievements, particularly his discovery of the famous Burgess Shale Fauna of soft-bodied Cambrian animals, and for his immediate recognition of the Fauna's importance to knowledge of the evolution of life.

Ellis Yochelson, the author of this biography, is a paleontologist who has worked for many years in one of the government agencies led and developed by Walcott several generations ago. Yochelson also has become a historian of geology and particularly of the varied and awesomely successful career of Walcott. Yochelson fully understands the intricacies of Walcott's science and the superb calibre of his achievements. Also, he has an insider's view of national scientific agencies based in Washington and the difficult financial and political challenges to managing them effectively.

This book is a labour of love by Yochelson: love of the science of paleontology, love of the significant contributions to stratigraphic geology that paleontology makes, love of the histories of the United States Geological Survey and of the United States National Museum, and of the dedication of the many outstanding scientists who have been part of these two renowned organizations. It reflects the author's esteem for Walcott and respect for the phenomenal achievements that he made during his life.

However, Yochelson's title *Charles Doolittle Walcott, Paleontologist* is misleading and totally inappropriate. Walcott's most renowned contributions as a paleontologist were his discovery and descriptions of the Burgess Shale Fauna. These are not mentioned in the present book, which deals only with the period from Walcott's birth in 1850 to 1907, the end of his leadership of the United States Geological Survey as its third Director, 1894-1907. He left to become the Secretary of the Smithsonian Institution but his work there and his other later achievements are beyond the purview of the book. The biography deals only with Walcott's formative years and with his career with the United States Geological Survey. Besides his work as a paleontologist, the book fully describes his organizational leadership and scientific influence during the period.

Although the Walcott family was financially secure and Charles's intellect was obvious, Walcott did not go to college when he finished school at 18. Instead, in 1868 he went to work at the Rust Farm in upstate New York, where the fossils of the Trenton Limestone provided respite from the daily drudgery of the dairy farm. Three generations of Rusts had collected fossils and developed local lore of the occurrences of beds that contained particular faunas. Walcott was an eager recruit and soon developed his own technical and scientific methods. Right from the start of this paleontological career, he recognized the need for rigorously recording geographic and stratigraphic details of the occurrence of each collection of fossils, starting this data base in 1868! Amazingly, he initiated correspondence from Rust Farm concerning his collections of fossils with several of the prominent paleontologists and stratigraphic geologists of the day. An early scientific achievement was the recognition of legs in a few specimens of trilobites. These trilobites were preserved in solid limestone, and Walcott developed methods of serial sections to allow him to interpret the details of these appendages and to suggest models for the locomotion of this group of early arthropods. His first scientific publication appeared in 1875 in the *Cincinnati Quarterly Journal of Science* and he soon became known as a skilled collector of fossils and as a talented amateur paleontologist.

In 1876, Walcott and most of his fossil collections went to Albany where he

worked as a temporary assistant to the irascible James Hall, State Paleontologist of New York. Walcott was a tireless and proficient worker and quickly learned from Hall the methodology of the preparation of formal paleontological publications. Hall's personality led to continuing problems in dealing with senior officials and political leaders and in trying to ensure adequate financial support for scientific work. Observing these problems, Walcott began a lifelong practise of open communication with legislators, senior bureaucrats, and influential businessmen. The apprenticeship with Hall did not lead to a permanent position in Albany, but the high esteem for Walcott's work among respected scientists led his appointment to the embryonic United States Geological Survey in 1879.

Immediately, he began field work in the western frontier and faced the challenge of applying the principles learned in upstate New York to much thicker stratigraphic sequences. His work was eminently successful in dating and subdividing Lower Paleozoic and Precambrian rocks, particularly in central Nevada, southern California and the Grand Canyon. Formal description of the faunas was a high priority, and Walcott's extensive paleontological publications led to his global recognition as an authority on Cambrian and Ordovician trilobites. His managerial abilities and political skills were also recognized, and in 1894 he became Director of the Survey. As in this century, there were several periods of deep cuts in government spending ("The Government will spare neither time nor money in the pursuit of economy." 1892, p. 297). Not only did Walcott succeed in maintaining the USGS during these hard times, but he foresaw vital needs for government studies in irrigation, water supply, forestry and geophysical studies and his well-placed advice contributed to the eventual establishment of new federal programs in these areas, some within the USGS, some in other agencies.

Walcott was a ready and proficient speaker to all types of audiences, with the ability to communicate scientific challenges in everyday language. He rapidly became an influential executive member and eventually president of virtually every scientific organization in Washington. Walcott became a shrewd but soft-key lobbyist, very effective at keeping potential allies and critics informed of present and future issues. Social and professional contacts were maintained with senators, congressmen and business leaders and his advice was sought by President Roosevelt concerning the initiation of several scientific programs. Eventually he moved on to other challenges, leaving a robust and healthy USGS staffed with excellent and dedicated scientists.

Throughout his career, Walcott overcame periods of chronic ill health (headaches, sciatica, teeth problems) to maintain an effective, highly disciplined and exacting regimen, fitting a few weeks of field work or a few hours of laboratory science within ever-demanding administrative schedules. He used assistants well and wrote quickly and simply, maintaining substantial productivity of scientific publication despite his managerial responsibilities. Tragedies plagued his personal life. He married three times: Lura became sickly and died in 1876; in 1911 a railroad accident killed Helena; Walcott married Mary Vaux in 1914. She was with him until his death in 1927, still hard at work on Cambrian paleontology.

Every book has its own particular audience, but this book seems to have been aimed at several audiences with disparate interests. First, an audience interested in the evolution of stratigraphic paleontology and geology in the late 19th century and in the personal characters of those who led developments in the United States. Fascinating details of the actions and personalities of James Hall, Louis Agassiz, Clarence King, John Wesley Powell, G.K. Gilbert, O.C. Marsh, T.C. Chamberlin and Charles Schuchert are presented, as are those of Andrew Carnegie, who provided enormous personal wealth to fund intellectual developments nationally. Yochelson inserts many lucid descriptions of the nature of scientific methods in paleontology and geology, and these descriptions greatly aid nontechnical readers.

Second, an audience for the machinations of government scientific agencies and their political masters. Walcott became an outstandingly effective scientific advisor who recognized the need for regular and open communication at every level and for creative forward planning so that when needs and opportunities suddenly arose, the United States Geological Survey could be well prepared to provide vital advice and to accept relevant responsibilities. He excelled in the building of consensus. The reader will recognize situations that have their parallels in the present, and will appreciate that Walcott's methods and skills are just as appropriate today.

Third, an audience that is deeply interested in the year-by-year and month-by-month history of the United States Geological Survey. The material available to Yochelson was enormous, primarily because, throughout his life, Walcott meticulously kept a journal giving details of his daily activities. Yochelson seems to have been mesmerized by this wealth of information and his presentation of many of these details within the biography does document day-by-day activities for future archivists.

However, this reader would have preferred such detail only for the most significant events.

Supplying the needs of these disparate audiences has resulted in a very long book, organized chronologically, full of information but challenging to read. One would have appreciated some summaries of Walcott's achievements in the different aspects of his career, and particularly a more extensive discussion of the imprint that his tenure as Director left on the United States Geological Survey.

A book of 512 pages contains a lot of prose, but this is remarkably free of mistakes other than some grammatical idiosyncrasies. However, the book does suffer from the use of computer spellchecks that have enforced correct spellings, but, in some places, of the wrong words. A memorable example is on page 347: ".....1898.....Yellowstone National Park.....there were no rangers in the National Park Service, what protection the Park had from tree and wildlife poachers was provided by the United States Calvary.....".

In summary, for the dedicated reader, the biography provides a fascinating description of part of the life of a remarkable scientist. As such, it belongs on the bookshelves of research organizations and academies and will be prized highly in the personal libraries of scientists concerned with research on Lower Paleozoic rocks and faunas.