THE GEOLOGICAL AND PALEONTOLOGICAL CONTRIBUTIONS OF WILLIAM "BILL" A. COBBAN

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ABSTRACT

W. A. "Bill" Cobban is one of the most highly respected and published geologist/paleontologists. He is an extraordinary fieldworker, biostratigrapher, paleontologist, geologist and mapmaker. With a career that has spanned more than 60 years he has fundamentally changed our understanding of the Upper Cretaceous Western Interior and made it explicable, logical and comprehensible.

INTRODUCTION

William Aubrey "Bill" Cobban was born more than 90 years ago, on Dec. 31, 1916, in Great Falls, Montana. He attended the University of Montana in Missoula and in 1940 went to work for Carter Oil Company (now Exxon) as a geologist, stratigrapher and map maker. In 1946, Bill attended Johns Hopkins University and received his PhD in 1949. He began his U. S. Geological Survey (USGS) career in 1948 with field work on the Cretaceous bentonite deposits of southeastern Montana and northwestern South Dakota.

During his early years at the USGS, Bill worked with John B. Reeside, Jr., the father of modern Western Interior biostratigraphy (Reeside 1957). Throughout his years with the USGS, Bill also spent a great deal of time in the field and collaborating on publications with colleagues James Gill and Glenn Scott. These three spent most of their careers collecting, mapping and publishing on the geology, stratigraphy and the invertebrate fauna of the Western Interior Upper Cretaceous marine sediments. The collections that these geologists assembled are unequaled anywhere and their research of these fossils developed and refined our ideas of biostratigraphy within the marine Western Interior. Throughout the last 60+ years, Bill has also collaborated with other respected paleontologists such as the late John "Jake" Hancock, Stephen Hook, Ralph W. Imlay, Glenn Izett, George "J. A." Jeletzky, Erle Kauffman, W. James Kennedy, James I. Kirkland, Herbert C. Klinger, E. Allen Merewether, Douglas J. Nichols, John D. Obradovich, Ireneusz Walaszczyk and many others including the authors, Neil Landman and Neal Larson.

GEOLOGICAL AND PALEONTOLOGICAL CONTRIBUTIONS

Bill Cobban is responsible for naming and defining most of the 71 Upper Cretaceous ammonite zones of the Western Interior (Appendix 1). Along with John Obradovich, they were also able to date most of the Late Cretaceous bentonite layers (Obradovich and Cobban 1975, Dyman et al. 1994, Fassett et al. 1997, Izett et al. 1998, Cobban et al. 1996). These zones, and their corresponding ages, are recognized and used by geologists worldwide as the standard for Upper Cretaceous zonation of the US Western Interior. Bill, along

with W. James Kennedy and Neil Landman (Kennedy and Cobban 1997, Kennedy, et al. 1997, 2000), is also responsible for correlating the Western Interior with much of the Gulf and Atlantic Coasts. This, in turn, has enabled many paleontologists from Asia, Africa and Europe to correlate their ammonite zones with those of the Western Interior.

Beginning in the 1950's and up to the present, Bill has produced several seminal works on ammonites, geology and biostratigraphy along with numerous monographs and papers on Late Cretaceous ammonites. This includes his work on the scaphite fauna of the Colorado Group (Cobban 1951) and the ammonite fauna and stratigraphy of the Colorado Group of northern Montana with C. E. Erdmann and others (Cobban et al, 1956, 1959, 1976). He worked with John B. Reeside, Jr. on the cephalopods of the Mowry Shale (Reeside and Cobban 1960) and accomplished a phenomenally detailed study of the Pierre Shale at Red Bird, Wyoming, with James Gill (Gill and Cobban 1966). In 1969 Cobban published the definitive study on dimorphism in scaphitid ammonites (Cobban 1969). He and his close friend, Glenn Scott, published the stratigraphy and ammonite fauna of the Graneros Shale and Greenhorn Limestone near Pueblo, Colorado (Cobban and Scott 1972). In 1976 he and W. James Kennedy published an incredibly insightful book on ammonite ecology (Kennedy and Cobban 1976). He and Earl Merewether studied the eastern margin of the Western Interior Seaway in The Mid-Cretaceous formations in Minnesota and South Dakota (Cobban and Merewether 1983). Along with W. James Kennedy and Steve Hook they undertook exhaustive studies on the ammonites of New Mexico (Cobban and Hook 1984; Cobban, Hook, and Kennedy 1987), and with W. James Kennedy and Jake Hancock they correlated the ammonite zones of North America with those in Europe (Hancock et al, 1983). His latest works have been on the integration of ammonite and inoceramid biostratigraphy with Ireneusz Walaszczyk and Peter Harries (Walaszczyk and Cobban 2000, Walaszczyk et al, 2001). These publications resulted in a USGS Zonal table for the entire upper Cretaceous of the Western Interior based on ammonites, inoceramids and radiometric ages (Cobban et al, 2006).

Bill Cobban has been involved in the systematic descriptions of hundreds of invertebrate fossils. He has named at least 35 genera, 2 subgenera, 214 species, and 11 varieties of ammonites along with 18 species of inoceramids (Appendix 2). He is a disciplined researcher who has authored and co-authored more than 300 papers on the invertebrates, biostratigraphy and geology of the North American Late Cretaceous (Appendix 4). At 90, Bill continues to research and publish; eight of the papers presented at the symposium in his honor listed Bill Cobban as a co-author.

Throughout Bill's career, he has visited and collected more Cretaceous outcrops than any other geologist. From his records he has created a USGS database that contains 14,000 Mesozoic mollusk localities from the Western Interior alone, not to mention the untold dozens of other localities he has visited in the southern, southeastern and eastern United States. At every locality, Bill took measurements (whenever possible), collected fossils and made impeccable notes. His publications show his uncanny abilities of observation, interpretation and deduction. Bill has shared his knowledge with all those around him and with all those who visited him at Denver or accompanied him in the field.

The collections Bill has helped assemble for the USGS represent the fauna from almost every Upper Cretaceous biozone and locality within the Western Interior, the Gulf and the Atlantic Coastal Regions. However, it is his work on ammonites, his collections from nearly 70 years, and his meticulous organization of these collections (which contain much more than just ammonites) that still inspire continued research and publications. Bill is currently working on organizing the extensive Cretaceous invertebrate collections at the

USGS Denver Federal Center, and co-authoring several new manuscripts on the Late Cretaceous ammonites of the Western Interior. His current work includes co-authoring a three-series monograph on the Campanian and Lower Maastrichtian Scaphitidae of the Western Interior, organizing the Placenticeratidae from the Gulf Coast and Western Interior, and several other projects.

HONORS

Throughout the years, Bill has been periodically honored by his peers. He has had four ammonite genera, one plant genus and 17 species of invertebrates named after him (see Appendix 4), more are currently in the works. In 1974 Bill received the Meritorious Service Award which is the second-highest departmental honor award that can be granted to a career employee in the Department of the Interior. In 1985 he was awarded the Distinguished Geologist Pioneer Award and the Paleontological Medal, which is awarded by the Paleontological Society to recognize outstanding contributions in paleontology. In 1986 he was given the Distinguished Service Award which is the highest departmental honor award that can be granted to a career employee of the Department of the Interior. In 1990 he was awarded the Raymond C. Moore Paleontology Medal by the Society for Sedimentary Geology (SEPM) International, in recognition of "Excellence in Paleontology. In 2004, Bill was honored by the participants of the 6th International Symposium on Cephalopods Past and Present for his unselfish, meritorious, lifetime work on the Late Cretaceous ammonites of North America. In addition, on August 26 & 27, 2006, a symposium entitled **'The Paleontology, Geology, and Stratigraphy of the Western Interior Late Cretaceous Seaway; A tribute to the life of W. A. "Bill" Cobban'** was held at the Green Center, Colorado School of Mines, Golden, Colorado, as a tribute to Bill for all of his accomplishments. This symposium was sponsored by the Association of Applied Paleontological Sciences, Black Hills Institute of Geological Research, Black Hills Museum of Natural History, American Museum of Natural History, Denver Museum of Nature and Science, the Western Interior Paleontological Society and the United States Geological Survey. Bill was again honored in 2007 with the Dallas Peck Award for a lifetime scientific excellance achievement award. The US Geological Survey's geologic division chief created this award to specifically address the fact that Bill reached the pinnicle in USGS awards 20 years ago, has continued to be productively working and deserved to be formally recognized once again.

CONCLUSION

William Aubrey "Bill" Cobban has always been an unselfish teacher to anyone who ever visited him at the Denver Federal Center. He has inspired many people to choose paleontology as a career or as a hobby. If not for Bill Cobban, our understanding of the Western Interior and its correlation with the Cretaceous of the rest of the world would be much poorer. Without Bill's inspirational and dedicated work, geologists, paleontologists and biologists, would still be a long way from understanding the Western Interior Cretaceous biostratigraphy. Bill has authored and co-authored more than 300 papers on the invertebrates, biostratigraphy and geology of the North American Late Cretaceous; published nearly 300 new genera, subgenera, species, and varieties of invertebrates; named and defined most of the 71 Upper Cretaceous ammonite zones of the Western Interior; measured, described and published most of the Late Cretaceous marine stratigraphy of the Western Interior; co-authored numerous geological and stratigraphical maps; and, along with John

Obradovich, dated most of the Upper Cretaceous bentonite layers. Bill's knowledge and passion for ammonites and Cretaceous stratigraphy is unequaled anywhere; his continued commitment to the Western Interior Cretaceous invertebrate fauna is important to everyone who studies Cretaceous geology.

ACKNOWLEDGEMENTS

Thanks to all who worked with Bill over the years and to all of the amateurs, who in their own way, also added to the information about the Western Interior Seaway. Thanks to Steve D. Jorgensen who helped organize the Cobban Symposium and the sponsors of that event, the Association of Applied Paleontological Sciences, Black Hills Institute of Geological Research, Black Hills Museum of Natural History, American Museum of Natural History, Denver Museum of Nature and Science, the Western Interior Paleontological Society and the United States Geological Survey. Thanks to Kevin McKinney, Steve Hook and so many more, but especially we thank W. A. "Bill" Cobban for all that he has done, all that he continues to do and all that he has inspired.

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APPENDIX 1 should be given as a figure to help the uninitated

THE UPPER CRETACEOUS AMMONITE RANGE ZONES OF THE WESTERN INTERIOR

William A. Cobban (Subzones added)

Upper Maastrichtian - 65.51 ± 0.10*

***Jeletzkytes nebrascensis* Range Zone**

***Hoploscaphites nicolletii* Range Zone**

Upper *Hoploscaphites nicolletii* Subzone
Lower *Hoploscaphites nicolletii* Subzone

***Hoploscaphites birkelundae* Range Zone**

Lower Maastrichtian

***Baculites clinolobatus* Range Zone** - 69.59 ± 0.36*

***Baculites grandis* Range Zone** - 70.00 ± 0.45*

***Baculites baculus* Range Zone**

Jeletzkytes criptonodosus Subzone
Upper *Jeletzkytes crasssus* Subzone

***Upper Baculites eliasi* Range Zone**

Lower *Jeletzkytes crasssus* Subzone

Upper Campanian- 71.6 ± 0.6*

***Lower Baculites eliasi* Range Zone -** 71.98 ± 0.31

***Baculites jenseni* Range Zone**

***Baculites reesidei* Range Zone**

***Baculites cuneatus* Range Zone**

***Baculites compressus* Range Zone** - 73.35*

***Didymoceras cheyennense* Range Zone**

***Exiteloceras jenneyi* Range Zone** - 74.76*

***Didymoceras stevensoni* Range Zone**

***Didymoceras nebrascense* Range Zone** - 75.89*

Middle Campanian

***Baculites scotti* Range Zone**

Didymoceras jorgenseni Subzone
Didymoceras binodosum Subzone

***Baculites reduncus* Range Zone**

***Baculites gregoryensis* Range Zone**

***Baculites perplexus* Range Zone**

Baculites perplexus (late form) Subzone
Baculites gilberti Subzone
Baculites perplexus (early form) Subzone

***Baculites* sp. (smooth species) Range Zone**
Baculites asperiformis* Range Zone*:
***Baculites mclearni* Range Zone**
***Baculites obtusus* Range Zone** - 80.54*

Lower Campanian

***Baculites* sp. (weak flank ribs) Range Zone**
***Baculites* sp. (smooth) Range Zone**
***Scaphites hippocrepis III* Range Zone**
***Scaphites hippocrepis II* Range Zone** - 81.71*
***Scaphites hippocrepis I* Range Zone**
***Scaphites leei III* Range Zone**

Upper Santonian

***Desmoscaphites bassleri* Range Zone** - 83.91*
***Desmoscaphites erdmanni* Range Zone**
***Clioscaphites choteauensis* Range Zone**

Lower Santonian

***Clioscaphites vermiformis* Range Zone**
***Clioscaphites saxitonianus* Range Zone**

Upper Coniacian

***Scaphites depressus* Range Zone** - 86.92*
***Scaphites ventricosus* Range Zone**

Lower Coniacian

***Forresteria alluaual* Range Zone** - 88.34*
***Forresteria hobsoni* Range Zone**

Upper Turonian

***Prionocyclus germari* Range Zone**
***Scaphites nigricollensis* Range Zone**
***Scaphites whitfieldi* Range Zone**

Middle Turonian

***Scaphites ferronensis* Range Zone**
***Scaphites warreni* Range Zone**
***Prionocyclus macombi* Range Zone** - 90.21*
***Prionocyclus hyatti* Range Zone** - 90.51*
***Collignonoceras praecox* Range Zone**
***Collignonoceras woollgari* Range Zone**

Lower Turonian

***Mammites nodosoides* Range Zone**

***Vascoceras birchbyi* Range Zone** - 93.40*

***Pseudoaspidoceras flexuosum* Range Zone**

***Watinoceras devonense* Range Zone**

Upper Cenomanian

***Nigericeras scotti* Range Zone**

***Neocardioceras juddii* Range Zone** - 93.59*

***Burroceras clydense* Range Zone**

***Sciponoceras gracile* Range Zone**

Euomphaloceras septemseriatum Subzone

Vascoceras diatianum Subzone - 93.90*

***Metoicoceras mosbyense* Range Zone**

Dunveganoceras conditum Subzone

Dunveganoceras albertense Subzone

***Dunveganoceras problematicum* Range Zone**

***Dunveganoceras pondi* Range Zone** - 94.71 $\pm$ 0.49*

Middle Cenomanian

***Plesiacanthoceras wyomingense* Range Zone**

***Acanthoceras amphibolum* Range Zone** - 94.96 $\pm$ 0.50*

***Acanthoceras bellense* Range Zone**

***Acanthoceras muldoonense* Range Zone**

***Acanthoceras granerosense* Range Zone**

***Conlinoceras tarrantense* Range Zone** - 95.73 $\pm$ 0.61*

Lower Cenomanian

***Neogastroplites maclearni* Range Zone** - 97.17*

***Neogastroplites americanus* Range Zone**

***Neogastroplites muelleri* Range Zone**

***Neogastroplites cornutus* Range Zone** - 98.52*

***Neogastroplites hassi* Range Zone** - 98.54*

*Dates in MY and are based on Argon/Argon analysis of samples from bentonite beds within accompanying zones, taken from Cobban et al, 2006.

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APPENDIX 2

GENERA AND SPECIES OF FOSSILS NAMED BY WILLIAM A. COBBAN

AMMONITE GENERA

Alzadites KENNEDY and COBBAN, 1993d
Bassites COBBAN, 1987d
Buccinammonites KENNEDY and COBBAN, 1993d
Buroceras COBBAN, HOOK, and KENNEDY, 1989
Chesapeakella KENNEDY and COBBAN, 1993e
Cibolaites COBBAN and HOOK, 1983
Clioscaphites COBBAN, 1951b
Collignoniceraties KENNEDY, COBBAN and LANDMAN, 2001
Conlinoceras COBBAN and SCOTT, 1972
Cryptometoicoceras KENNEDY and COBBAN, 1993d
Cryptotexanites KENNEDY and COBBAN, 1993e
Didymoceratoides COBBAN and KENNEDY, 1993a
Herrickiceras COBBAN and HOOK, 1980
Infabricaticeras COBBAN, HOOK and KENNEDY, 1989
Johnsonites COBBAN, 1961
Kastanoceras KENNEDY and COBBAN, 1993d
Litophragmatoceras KENNEDY and COBBAN, 1988c
Microdiphasoceras COBBAN, HOOK, and KENNEDY, 1989
Microsulcatoceras KENNEDY and COBBAN, 1993d
Moremanoceras COBBAN, 1971
Morrowites COBBAN and HOOK, 1983
Nebraskites KENNEDY and COBBAN, 1988b
Ojinagiceras COBBAN and KENNEDY, 1989a
Paraburoceras COBBAN, HOOK and KENNEDY, 1989
Paracompsoceras COBBAN, 1971
Paraconlinoceras KENNEDY and COBBAN, 1990
Plesiacanthoceratoides KENNEDY and COBBAN, 1990
Pseudobaculites COBBAN, 1952
Puebloites COBBAN and SCOTT, 1972
Platyscaphites COBBAN, KENNEDY and LANDMAN 1999
Rhamphidoceras COBBAN and KENNEDY, 1990
Rubroceras COBBAN, HOOK and KENNEDY, 1989
Spiroxybeloceras KENNEDY and COBBAN, 1999
Trachybaculites COBBAN and KENNEDY, 1995
Trachyscaphites COBBAN and SCOTT 1964

AMMONITE SUBGENERA

Haresiceras REESIDE *(Mancosiceras)* COBBAN, 1971
Vascoceras CHOFFAT (*Greenhornoceras*) COBBAN and SCOTT, 1972

AMMONITE SPECIES

Acanthoceras amphibolum fallense COBBAN, 1987
Acanthoceras granerosense COBBAN and SCOTT, 1972
Acanthoceras muldoonense COBBAN and SCOTT, 1972
Alzadites alzadensis KENNEDY and COBBAN, 1993d
Alzadites incomptus KENNEDY and COBBAN, 1993d
Alzadites westonensis KENNEDY and COBBAN, 1993d
Ampakabites collignoni COBBAN and SCOTT, 1972
Anaklinoceras gordiale COBBAN, KENNEDY and SCOTT, 1992b
Anaklinoceras incertum COBBAN, KENNEDY and SCOTT, 2000b
Anaklinoceras minutum COBBAN, KENNEDY and SCOTT, 2000a
Anaklinoceras tenuicostatum KENNEDY and COBBAN, 1994b
Anisoceras coloradoense COBBAN, HOOK and KENNEDY, 1989
Axonoceras sohli COBBAN 1974a
Baculites compressus robinsoni COBBAN, 1962a
Baculites cuneatus COBBAN, 1962a
Baculites eliasi COBBAN, 1958
Baculites gilberti COBBAN, 1962b
Baculites gregoryensis COBBAN, 1951a
Baculites jenseni COBBAN, 1962a
Baculites larsoni COBBAN and KENNEDY, 1992a
Baculites mariasensis COBBAN, 1951a
Baculites perplexus COBBAN, 1962b
Baculites reduncus COBBAN, 1977
Baculites rugosus COBBAN, 1962a
Baculites scotti COBBAN, 1958
Baculites sweetgrassensis COBBAN, 1951a
Baculites texanus KENNEDY and COBBAN, 1999
Bassites reesidei COBBAN, 1987d
Binneyites carlilensis COBBAN 1961
Binneyites nodosus COBBAN 1961
Binneyites rugosus COBBAN 1961
Borissiakoceras ashurkoffae COBBAN and GRYC 1961
Borissiakoceras compressum COBBAN 1961
Borissiakoceras inconstans COBBAN and GRYC 1961
Buccinammonites minimus KENNEDY and COBBAN, 1993d
Buroceras clydense COBBAN, HOOK and KENNEDY, 1989
Buroceras irregulare COBBAN, HOOK and KENNEDY, 1989
Buroceras transitorium COBBAN, HOOK and KENNEDY, 1989
Calycoceras boreale KENNEDY COBBAN and LANDMAN, 1996a
Calycoceras inflatum COBBAN, HOOK and KENNEDY, 1989
Calycoceras newboldi wyomingense COBBAN, 1988a
Calycoceras rubeyi COBBAN, 1988a
Carthaginites aquilonius KENNEDY and COBBAN, 1993d
Chesapeakella nodatum KENNEDY and COBBAN, 1993e

Cibolaites molenaari COBBAN and HOOK, 1983
Clioscaphites choteauensis COBBAN, 1951b
Clioscaphites montanensis COBBAN, 1951b
Clioscaphites platygastrus COBBAN, 1951b
Coilopoceras inflatum COBBAN and HOOK, 1980
Collignoniceras jorgenseni KENNEDY, COBBAN and LANDMAN, 2001
Collignoniceraties collisneger KENNEDY, COBBAN and LANDMAN, 2001
Conlinoceras gilberti COBBAN and SCOTT, 1972
Cryptometoicoceras mite KENNEDY and COBBAN, 1993d
Cryptotexanites paedomorphicus KENNEDY and COBBAN, 1993e
Cunningtoniceras arizonense KIRKLAND and COBBAN, 1986
Cunningtoniceras cookense COBBAN, HOOK and KENNEDY, 1989
Cunningtoniceras novimexicanum COBBAN, HOOK and KENNEDY, 1989
Desmoscaphites erdmanni COBBAN, 1951b
Didymoceras aurarium COBBAN, KENNEDY and SCOTT, 2000
Didymoceras binodosum, COBBAN and KENNEDY, 1993a
Didymoceras clardyi, COBBAN and KENNEDY, 1993a
Didymoceras jorgenseni COBBAN, KENNEDY and SCOTT, 2000
Didymoceras platycostatum KENNEDY and COBBAN, 1993b
Didymoceras puebloense COBBAN, KENNEDY and SCOTT, 1997
Didymoceras wrighti COBBAN, KENNEDY and SCOTT, 2000
Discoscaphites sphaeroidalis KENNEDY and COBBAN, 2000
Dunveganoceras albertense montanense COBBAN, 1953b
Dunveganoceras albertense regale COBBAN, 1988a
Dunveganoceras parvum COBBAN, 1953b
Dunveganoceras problematicum COBBAN, 1988a
Dunveganoceras problematicum natronense COBBAN, 1988a
Dunveganoceras problematicum problematicum COBBAN, 1988a
Engonoceras elegans KENNEDY, LANDMAN and COBBAN, 1998
Eubostrychoceras matsumotoi COBBAN, 1987c
Eucalycoceras templetonense COBBAN, 1988b
Euomphaloceras costatum COBBAN, HOOK and KENNEDY, 1989
Euomphaloceras merewetheri COBBAN, HOOK and KENNEDY, 1989
Exiteloceras jenneyi camacki KENNEDY, LANDMAN, COBBAN and SCOTT 2000
Exiteloceras rude KENNEDY, LANDMAN, COBBAN and JOHNSON 2000
Hamites salebrosus COBBAN, HOOK and KENNEDY, 1989
Hamites pygmaeus COBBAN, HOOK and KENNEDY, 1989
Herrickiceras costatum COBBAN and HOOK, 1980
Hoploscaphites gilli COBBAN and JELETZKY, 1965
Hoplitoides sandovalensis COBBAN and HOOK, 1980
Hoplitoplacenticeras minor COBBAN and KENNEDY, 1993a
Idiohamites bispinosus KENNEDY and COBBAN, 1993d
Idiohamites pulchellus KENNEDY and COBBAN, 1993d
Glyptoxoceras texanum KENNEDY, LANDMAN and COBBAN, 2001
Infabricaticeras lunaense COBBAN, HOOK and KENNEDY, 1989

Johnsonites sulcatus COBBAN 1961
Kanabiceras puebloense COBBAN and SCOTT, 1972
Kastanoceras spiniger KENNEDY and COBBAN, 1993d
Lewites sulcatus COBBAN, KENNEDY and SCOTT, 2000
Litophragmatoceras incomptum KENNEDY and COBBAN, 1988c
Menuites oralensis COBBAN and KENNEDY, 1993b
Metaptychoceras hidalgoense COBBAN, HOOK and KENNEDY, 1989
Metengoceras teigenense COBBAN and KENNEDY, 1989b
Metoicoceras bergquisti COBBAN, 1983
Metoicoceras frontierense COBBAN, 1988a
Metoicoceras mosbyense COBBAN, 1953b
Metoicoceras muelleri COBBAN, 1953b
Microdiphasoceras novimexicanum COBBAN, HOOK and KENNEDY, 1989
Microsulcatoceras crassum KENNEDY and COBBAN, 1993d
Microsulcatoceras puzosiiforme KENNEDY and COBBAN, 1993d
Microsulcatoceras texanum KENNEDY and COBBAN, 1993d
Moremanoceras costatum COBBAN, HOOK and KENNEDY, 1989
Moremanoceras bravoense COBBAN and KENNEDY, 1989a
Moremanoceras montanaense KENNEDY and COBBAN, 1993d
Moremanoceras straini KENNEDY, COBBAN and HOOK, 1988
Morrowites subdepressus COBBAN and HOOK, 1983
Mortoniceras beloventer KENNEDY, GALE, HANCOCK, CRAMPTON and COBBAN, 1999
Nannometoicoceras nanos KENNEDY and COBBAN, 1993d
Nannometoicoceras? *glabor* KENNEDY and COBBAN, 1993d
Nebraskites haresiceratiforme KENNEDY and COBBAN, 1988b
Neocardioceras densicostatum COBBAN, 1988b
Neocardioceras laevigatum COBBAN, 1988b
Neocardioceras minutum COBBAN, 1988b
Neocardioceras uptonense COBBAN, 1988b
Neogastroplites haasi REESIDE and COBBAN, 1960
Neogastroplites maclearni REESIDE and COBBAN, 1960
Neogastroplites muelleri REESIDE and COBBAN, 1960
Neostlingoceras apiculatum COBBAN, HOOK and KENNEDY, 1989
Neostlingoceras bayardense COBBAN, HOOK and KENNEDY, 1989
Neostlingoceras kottlowskii COBBAN and HOOK, 1981
Neostlingoceras procerum COBBAN, HOOK and KENNEDY, 1989
Neostlingoceras virdenense COBBAN, HOOK and KENNEDY, 1989
Nigericeras scotti COBBAN, 1971
Nostoceras arkansanum KENNEDY and COBBAN, 1993b
Nostoceras irregulare COBBAN and KENNEDY, 1995
Nostoceras larimerense COBBAN, KENNEDY and SCOTT, 2000
Nostoceras major KENNEDY and COBBAN, 1993c
Nostoceras mendryki COBBAN, 1974b
Nostoceras monotuberculatum KENNEDY and COBBAN, 1993a
Nostoceras plerucostatum KENNEDY and COBBAN, 1993a

Nostoceras puzosiforme KENNEDY and COBBAN, 1994a
Nostoceras rugosum COBBAN and KENNEDY, 1991b
Ojinagiceras ojinagaense COBBAN and KENNEDY, 1989a
Otoscaphites seabeensis COBBAN and GRYC 1961
Pachydiscus maconensis COBBAN and KENNEDY, 1995
Paraburoceras minutum COBBAN, HOOK and KENNEDY, 1989
Paracompsoceras landisi COBBAN, 1971
Parasolenoceras pulcher COBBAN and KENNEDY, 1991b
Placenticeras minor KENNEDY and COBBAN, 1994a
Placenticeras pingue KENNEDY COBBAN and LANDMAN, 1996b
Platiknemiceras flexosum KENNEDY, LANDMAN and COBBAN, 1998
Platyscaphites elginensis COBBAN, KENNEDY and LANDMAN 1999
Platyscaphites fremontensis COBBAN, KENNEDY and LANDMAN 1999
Platyscaphites groatensis COBBAN, KENNEDY and LANDMAN 1999
Prionocyclus quadratus COBBAN, 1953a
Prionocyclus pluricostatus KENNEDY, COBBAN and LANDMAN, 2001
Protacanthoceras alzadense COBBAN, 1987a
Protacanthoceras fisherense COBBAN, 1987a
Protacanthoceras hosei hosei COBBAN, 1987a
Protacanthoceras hosei sheridanense COBBAN, 1987a
Protacanthoceras hosei COBBAN, 1987a
Protacanthoceras vetula COBBAN, 1987a
Pseudobaculites nodosus COBBAN, 1952
Pseudobaculites wyomingensis COBBAN, 1952
Puebloites greenhornensis COBBAN and SCOTT, 1972
Puebloites spiralis COBBAN and SCOTT, 1972
Puzosia serratocarinata KENNEDY and COBBAN, 1988a
Reginaites exilis KENNEDY and COBBAN, 1991
Rhaeboceras coloradoense COBBAN, 1987b
Rhaeboceras burkholderi COBBAN, 1987b
Rhamphidoceras saxitalis COBBAN and KENNEDY, 1990
Rubroceras alatum COBBAN, HOOK and KENNEDY, 1989
Rubroceras buroense COBBAN, HOOK and KENNEDY, 1989
Rubroceras rotundum COBBAN, HOOK and KENNEDY, 1989
Scaphites auriculatus COBBAN, 1951b
Scaphites coloradoensis COBBAN, 1951b
Scaphites borealis COBBAN and KENNEDY 1991a
Scaphites coloradensis COBBAN, 1951b
Scaphites corvensis COBBAN, 1951b
Scaphites delicatulus sloani COBBAN, 1983
Scaphites ferronensis COBBAN, 1951b
Scaphites frontierensis COBBAN, 1951b
Scaphites hippocrepis (DeKAY) I COBBAN, 1969
Scaphites hippocrepis (DeKAY) II COBBAN, 1969
Scaphites impendicostatus COBBAN, 1951b

Scaphites leei REESIDE I COBBAN, 1969
Scaphites leei REESIDE II COBBAN, 1969
Scaphites leei REESIDE II COBBAN, 1969
Scaphites mariasensis COBBAN, 1951b
Scaphites nigricollensis COBBAN, 1951b
Scaphites patulus COBBAN, 1951b
Scaphites pisinnus COBBAN, 1951b
Scaphites praecoquus COBBAN, 1951b
Scaphites preventricosus COBBAN, 1951b
Scaphites sagensis COBBAN, 1951b
Scaphites subdelicatulus COBBAN and GRYC 1961
Scaphites tetonensis COBBAN, 1951b
Scaphites uintensis COBBAN, 1951b
Scaphites ventricosus COBBAN, 1951b
Scaphites veterinovus COBBAN, 1951b
Scaphites whitfieldi COBBAN, 1951b
Solenoceras bearpawense KENNEDY, LANDMAN, COBBAN and SCOTT 2000
Solenoceras elegans KENNEDY, LANDMAN, COBBAN and SCOTT 2000
Solenoceras larimerense KENNEDY, LANDMAN, COBBAN and SCOTT 2000
Solenoceras nitidum COBBAN 1974a
Spiroxybeloceras kimbroense KENNEDY and COBBAN, 1999
Tarrantoceras exile KENNEDY and COBBAN, 1993d
Tarrantoceras flexicostatum COBBAN, 1988b
Thomelites robustus KENNEDY, COBBAN, HANCOCK and HOOK 1989
Trachyscaphites alabamensis COBBAN and KENNEDY, 1995
Trachyscaphites densicostatus COBBAN and KENNEDY, 1992
Trachyscaphites praespiniger COBBAN and SCOTT, 1964
Trachyscaphites redbirdensis COBBAN and SCOTT, 1964
Trachyscaphites spiniger porchi COBBAN and SCOTT, 1964
Tragodesmoceras carlilense COBBAN, 1971
Tragodesmoceras socorroensis COBBAN and HOOK, 1979
Turrilites acutus americanus COBBAN and SCOTT, 1972
Vascoceras birchbyi COBBAN and SCOTT, 1972
Watinoceras odonnelli COBBAN, HOOK and KENNEDY, 1989

AMMONITE VARIETIES

Clioscaphites montanensis COBBAN **var.** *hesperius* COBBAN, 1951b
Clioscaphites saxitonianus (McLEARN) **var.** *keytei* COBBAN, 1951b
Clioscaphites vermiformis (MEEK AND HAYDEN) **var.** *toolensis* COBBAN, 1951b
Scaphites corvensis WARREN **var.** *bighornensis* COBBAN, 1951b
Scaphites delicatulus WARREN **var.** *greenhornensis* COBBAN, 1951b
Scaphites impendicostatus COBBAN **var.** *erucoides* COBBAN, 1951b
Scaphites larvaeformis MEEK AND HAYDEN **var.** *obesus* COBBAN, 1951b
Scaphites mariasensis COBBAN **var.** *gracillistriatus* COBBAN, 1951b
Scaphites nigricollensis **var.** *meeki* COBBAN, 1951b

Scaphites preventricosus COBBAN **var.** *artilobus* COBBAN, 1951b
Scaphites preventricosus COBBAN **var.** *sweetgrassensis* COBBAN, 1951b
Scaphites warreni MEEK AND HAYDEN **var.** *haydeni* COBBAN, 1951b
Scaphites warreni MEEK AND HAYDEN v**ar.** *ubiquitosus* COBBAN, 1951b

INOCERAMID SPECIES

Cataceramus? gandjaeformis WALASZCZYK, COBBAN and HARRIES, 2001
Cataceramus? glendivensis WALASZCZYK, COBBAN and HARRIES, 2001
Cataceramus? oviformis WALASZCZYK COBBAN and HARRIES, 2001
Inoceramis dakotensis WALASZCZYK and COBBAN, 2000
"Inoceramis" altusiformis WALASZCZYK, COBBAN and HARRIES, 2001
"Inoceramis" balchiformis WALASZCZYK, COBBAN and HARRIES, 2001
"Inoceramis" conlini WALASZCZYK, COBBAN and HARRIES, 2001
"Inoceramis" convexiformis WALASZCZYK, COBBAN and HARRIES, 2001
"Inoceramis" pierrensis WALASZCZYK, COBBAN and HARRIES, 2001
"Inoceramis" redbirdensis WALASZCZYK, COBBAN and HARRIES, 2001
"Inoceramis" scotti WALASZCZYK, COBBAN and HARRIES, 2001
"Inoceramis" stephensoni WALASZCZYK, COBBAN and HARRIES, 2001
"Inoceramis" whitfieldi WALASZCZYK, COBBAN and HARRIES, 2001
"Inoceramis" wyomingensis WALASZCZYK, COBBAN and HARRIES, 2001
Mytiloides bellefourchensis WALASZCZYK and COBBAN, 2000
Mytiloides puebloensis KENNEDY, WALASZCZYK and COBBAN, 2000
Mytiloides ratonensis WALASZCZYK and COBBAN, 2000
Sphaeroceramus pertenuiformis WALASZCZYK, COBBAN and HARRIES, 2001

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W. A. Bill Cobban on an outcrop of Pierre Shale in South Dakota 2001 (photo by Neal L. Larson)

APPENDIX 4

GENERA AND SPECIES OF FOSSILS NAMED FOR WILLIAM A. COBBAN

GENERA

Cobbanites - IMLAY, 1962. A Jurassic ammonite.

Cobbanoceras - MATSUMOTO, 1965. A Cretaceous ammonite.

Cobbanoscaphites - COLLIGNON, 1969. A Cretaceous ammonite.

Billcobbanoceras - COOPER, 1994. A Cretaceous ammonite.

Cobbania - STOCKEY, ROTHWELL, and JOHNSON, 2007. A Cretaceous plant.

SPECIES

Ammobaculites cobbani - LOEBLICK and TAPPAN, 1950. A Cretaceous foraminifera.

Inoceramus cobbani - KELLUM, 1964. A Cretaceous pelecypod.

Scaphites cobbani - BIRKELUND, 1965. A Cretaceous ammonite.

Prionocyclus cobbani - MATSUMOTO, 1965. A Cretaceous ammonite.

Otoscaphites cobbani - COLLIGNON, 1965. A Cretaceous ammonite.

Watinoceras cobbani - COLLIGNON, 1966. A Cretaceous ammonite.

Thyasira becca cobbani - KAUFFMAN, 1967. A Cretaceous pelecypod.

Baculites cobbani - KHAKIMOV, 1976. A Cretaceous ammonite.

Yabeiceras cobbani - KENNEDY, WRIGHT, and KLINGER, 1983. A Cretaceous ammonite.

Eomunidopsis cobbani - BISHOP, 1985. A Cretaceous crab.

Anomia cobbani - HASENMUELLER and HATTIN, 1985. A Cretaceous pelecypod.

Plesiacanthoceras wyomingense cobbani - ATABEKJAN, 1985. A Cretaceous ammonite.

Actinocamax cobbani - CHRISTENSEN, 1993. A Cretaceous belemnite.

Mantelliceras cobbani - AMÉDRO, 1993. A Cretaceous ammonite.

Turritella cobbani - KIRKLAND, 1996. A Cretaceous gastropod.

Synarmocrinus cobbani - ITANO and BATEMAN, 2001. A Pennsylvanian crinoid.

Inoceramus cobbani - WALASZCZYK, ODIN, and DHONDT, 2002. A Cretaceous pelecypod.

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