

**U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT**

CONODONT ELEMENTS LACK PALEONTOLOGICAL INTEREST

Authority: Paleontological Resources Preservation Act of 2009 (16 U.S.C. 470aaa).

*The term “paleontological resource” means any fossilized remains, traces, or imprints of organisms, preserved in or on the earth’s crust, that are **of paleontological interest** and that provide information about the history of life on earth, except that the term does not include –*

- (A) any materials associated with an archaeological resource (as defined in section 3(1) of the Archaeological Resources Protection Act of 1979 (16 U.S.C. 470bb(1)); or*
- (B) any cultural item (as defined in section 2 of the Native American Graves Protection and Repatriation Act (25 U.S.C. 3001)).*

16 U.S.C. 470aaa (4); section 6301(4) of Public Law 111-11, March 30, 2009 (123 Stat. 1172).

I. Introduction

Do conodonts possess paleontological interest? If so, these tiny vertebrate fossils must be afforded the same management attention and protection measures that are applied to discoveries of dinosaurs and other prehistoric beasts and fauna. However, scientists who identify themselves as vertebrate paleontologists do not study conodonts, the phosphatic remains of tiny creatures, usually less than a millimeter in length. In fact, fewer than 20 scientists in North America¹ currently identify themselves as conodont experts.

Prior to the development of sophisticated geophysical analysis techniques (ca. 1980’s), oil and gas exploration companies employed micropaleontologists to identify and study the tiny fossils that were brought up from deep drill cores. The identity of these fossils, including conodonts, provided evidence for determining the age of the rock that was being drilled. Too young and the well needed to be drilled deeper, but too old and the well had overshot the mineral-bearing layers. The identity of these tiny fossils formed the basis for multi-million-dollar decisions of whether to continue drilling, or to stop and direct attention elsewhere. Today, few exploration companies employ paleontologists, but the branding of some companies, such as Shell (a fossil clam) or Sinclair (famous for the green dinosaur), are vestiges of the important role that the science of paleontology has played in the history of economic mineral development.

Today, conodonts continue to be used as index fossils and are important for charting biologic and climatic shifts that took place on Earth between 500 and 200 million years ago. There has been

¹ Dr. James Barrick, personal communication, September 17, 2019.

debate in the scientific community ever since their discovery in 1856 whether conodonts should be classified as vertebrate organisms. This creates an interesting dilemma for the management of conodonts by the Bureau of Land Management (BLM). Most researchers currently classify conodonts as vertebrate fossils, but none collects and studies them as they would vertebrate fossils; rather their remains are useful as geologic index fossils, most interesting for what they reveal about the context of geologic units. Where they are found, conodonts are extremely abundant, there is no commercial market for conodonts, and paleontologists and land managers universally agree that conodonts are not in need of special preservation measures such as those provided by the Paleontological Resources Preservation Act (PRPA).² Paleontologists and land managers agree that conodonts lack paleontological interest.

II. Determination of Paleontological Interest

What does it mean to lack paleontological interest? Fossils that lack paleontological interest should be objects that lack a commercial market and are generally not the subject of looting or illicit export. The term ‘paleontological interest’ first occurs in the UNESCO Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property³ (UNESCO 1970). Congress introduces the term again in the PRPA as an essential element of the definition of a paleontological resource.⁴ Under PRPA a paleontological resource is the evidence of past life on Earth that has paleontological interest. PRPA does not provide a definition of the term, but the context may be inferred by looking to UNESCO 1970 and its introduction of the terms ‘archaeological interest,’ ‘ethnological interest,’ and ‘artistic interest.’ Each participating nation-state is directed to determine what objects of ‘interest’ are subject to and protected by UNESCO 1970.

In the United States, the Convention on Cultural Property Implementation Act⁵ (CCPIA; the enabling legislation for UNESCO 1970) does not mention paleontological resources; both the absence of mention in CCPIA and the fact that the scope of PRPA is limited to lands managed by the Departments of the Interior and Agriculture limit the applicability of UNESCO 1970 to paleontological resources in the United States. However, as UNESCO 1970 was implemented to address the looting and illicit export of important ‘cultural objects,’ including paleontological resources, it is advisable that determinations that find that a paleontological resource lacks paleontological interest should be limited to occurrences of fossils that nation-states would not normally apply to UNESCO 1970. Basically, if the fossil occurrence lacks paleontological interest it should also lack applicability to UNESCO 1970.

² 16 U.S.C. 470aaa-1 – aaa-11

³ United Nations Educational, Scientific and Cultural Organization. Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property 1970. Paris, adopted by the General Conference at its sixteenth session, Paris, 14 November 1970

⁴ 16 U.S.C. 470aaa (4).

⁵ Public Law 97-446 [H.R. 4566], 96 Stat. 2329, approved January 12, 1983

Record of Decision

What is a conodont? Conodonts are a fossil marine animal that lived in Earth's oceans from the Cambrian to Triassic periods (spanning approximately 520 to 200 million years ago). Conodonts had a wormlike body, numerous small "tooth-like" elements, and a pair of eyes. Conodonts are believed by many paleontologists to be the earliest known vertebrate animals. The body of conodonts are poorly known, so the animal is identified by the comparatively abundant "tooth-like" elements that are different in structure and composition from the teeth of all other vertebrate organisms, therefore these phosphatic remains are referred to as conodont elements because they are not true teeth. Conodont elements are found in marine sedimentary rocks from the Cambrian through the Triassic periods and are usually less than 1 millimeter in length.

Do conodonts have value to commercial or recreational collectors? Conodonts do not possess commercial or recreational value. Conodonts are recovered by dissolving the surrounding rock,^{6,7} which requires skill, special equipment and chemicals, and time. Conodonts are not identifiable to the naked eye, so field sampling involves the collection of small rock samples that may or may not actually contain conodonts. The presence of conodonts is not revealed until the rock is completely dissolved in the laboratory. The complex process for recovering conodonts and their tiny size mean that conodonts are not the subject of either commercial or hobby collecting. Conodonts are, however, important biostratigraphic markers that are used to correlate rock layers to their time of deposition.

Professional opinions as to whether conodonts possess paleontological interest. Professional paleontologists who specialize in the study of conodonts agree that there is not a need to preserve conodonts as a paleontological resource under PRPA.^{8,9}

One professional paleontologist who currently works with conodonts stated, "*Even the well-known sites in the Midwest with exceptional preservation would require removal of 100s of kg of rock to 'deplete' the fauna. I can't think of a single site that deserves protection.*" –Dr. James Barrick, personal communication, September 17, 2019.

Another professional paleontologist who has specialized in the study of conodonts for more than 40 years states: "*In view of their general non-commercial interest I see absolutely no need for some sort of federal regulations for collecting conodonts on federal lands. In this, they differ completely from showy fossils such as dinosaurs. I know of no place in North America where there is a need to protect a conodont occurrence from commercial or other collectors.*" – Dr. Stig Bergstrom, personal communication, September 12, 2019.

⁶ http://barricklab.org/twiki/pub/Lab/LinkList/Barrick_Conodonts.pdf (accessed September 27, 2019)

⁷ Dr. James Barrick, personal communication, September 17, 2019.

⁸ *Ibid.*

⁹ Dr. Stig Bergstrom, personal communication, September 9, 2019.

Position of professional societies as to whether conodonts possess paleontological interest. The executive committees of three separate professional societies, the Society of Vertebrate Paleontology, the Paleontological Society, and the Association of Applied Paleontological Sciences, agree that conodonts are not in need of special preservation.

The Society of Vertebrate Paleontology (SVP) worked with Congress in support of numerous legislative proposals that would provide fossil preservation legislation. In all of these bills, the Society did not intend fossil protection legislation to include conodonts. In 1992, SVP discussed singling out conodonts as not being subject to the then proposed Vertebrate Paleontological Resources Protection Act, S.3109, 102nd Congress (aka “Baucus Bill”)^{10,11}. Even though many paleobiologists and taxonomists classify conodonts as vertebrate organisms (animals that have a backbone), conodonts are not extensively studied by scientists who identify themselves as vertebrate paleontologists and in 2019 the executive committee of SVP agreed that conodonts are not in need of special preservation.¹² SVP affirms that statement in 2022.¹³

The Paleontological Society (Paleo Society) is an international nonprofit organization that is devoted exclusively to the advancement of the science of paleontology, including invertebrate and vertebrate paleontology, micropaleontology, and paleobotany. Most scientists who devote their research to the study of conodonts are members of the Paleo Society and identify themselves professionally as either invertebrate paleontologists or micropaleontologists, not vertebrate paleontologists. In 2019, the executive committee of the Paleo Society agreed that the Federal Government should not manage conodonts as paleontological resources under PRPA.¹⁴ The Paleo Society confirms that statement in 2022.¹⁵

The Association of Applied Paleontological Sciences (AAPS) is an association of commercial fossil dealers, collectors, enthusiasts, and academic paleontologists that is devoted to promoting ethical collecting practices and cooperative liaisons with researchers, instructors, curators and exhibit managers in the paleontological academic and museum community. Members of AAPS worked with Congress in support of at least two bills that would have provided fossil management legislation. AAPS promotes access to paleontological resources on public lands for scientific purposes, recreation, and commercial collecting. Because many of their membership support commercial collection of paleontological resources, the AAPS opposed fossil preservation legislation that was promoted by SVP, including PRPA. However, in recent years

¹⁰ Ted Vlamis, Executive Committee and Government Affairs Committee member of the Society of Vertebrate Paleontology, personal communication, September 18, 2019.

¹¹ Pat Leigi, Government Affairs Committee member of the Society of Vertebrate Paleontology, personal communication, September 16, 2019.

¹² Dr. P. David Polly, Immediate Past President of the Society of Vertebrate Paleontology, personal communication, September 27, 2019.

¹³ Dr. Jessica Theodor, President of the Society of Vertebrate Paleontology, personal communication, July 8, 2022.

¹⁴ Dr. Steven Holland, Past President of the Paleontology Society, personal communication, September 11, 2019.

¹⁵ Dr. DiMichele, President, Paleontological Society, personal communication, July 11, 2022.

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AAPS has coordinated with professional societies, including the Paleo Society and SVP, and with the BLM to promote public access to fossils. Many members of AAPS are also members of the Paleo Society or SVP. In 2019 the executive committee of AAPS agreed with and in 2022 affirms the finding that conodonts do not possess commercial or recreational value and that these fossils are not in need of special management consideration by the Federal Government.¹⁶

Recommendation by BLM specialists as to whether conodonts possess paleontological interest.

Historically, conodont elements were an important biostratigraphic marker used in fluid mineral extraction. However, the BLM has never called out conodonts for special management. BLM geologists are concerned that rules under PRPA that would treat conodonts as paleontological resources might conflict with savings provisions at Section 6311 of that law that prevent the Act from imposing additional restrictions on mineral or leasing or disposal laws. BLM geologists and paleontologists are in broad agreement that fossils known as conodont elements should not be managed the same as paleontological resources.^{17,18,19,20}

The following reasons support this finding:

- where they are found conodonts are not rare;
- conodonts are not valuable to commercial or recreational collectors;
- land management bureaus do not have a history of managing conodonts;
- conodonts are not in need of special preservation measures.

In consideration of the reasons listed above, BLM paleontological and other specialists believe that conodonts lack paleontological interest under the meaning of PRPA. Recognizing that they lack paleontological interest exempts conodonts from the provisions of PRPA but does not lessen their importance as public land resources with scientific importance. Conodonts are still subject to management by the BLM under other authorities, including the Federal Land Policy and Management Act of 1976, as amended, 43 U.S.C. 1701 et seq. (FLPMA).

Preparation of this Document. This finding was prepared and recommended in 2019 by Scott Foss, BLM Senior Paleontologist. This document was updated in 2022 by Scott Foss, BLM HQ420 Division Chief, to include more recent concurrence by the professional community.

III. Finding

¹⁶ George Winters, Administrative Director of the Association of Applied Paleontological Sciences, personal communication, February 1, 2020.

¹⁷ Robin Hansen, BLM Petroleum Engineer, personal communication, September 27, 2019.

¹⁸ Peter Cowan, BLM Fluid Mineral Program Lead, personal communication, September 27, 2019.

¹⁹ Robin Hansen, BLM Petroleum Engineer, personal communication, July 8, 2022.

²⁰ Peter Cowan, BLM Senior Mineral Leasing Specialist, personal communication, July 8, 2022.

Record of Decision

The results of professional opinions from several conodont experts, the opinion of three separate professional societies that are devoted to the science of paleontology, and analysis by BLM specialists from the fluid minerals and paleontology programs universally agree that fossils known as conodonts are not in need of special preservation measures and that it would be inappropriate to manage conodont elements as a paleontological resource, defined by the Paleontological Resources Preservation Act of 2009 (16 U.S.C. 470aaa) and enacted by regulations at 43 C.F.R. Part 49.

Based on scientific and other management considerations the BLM has determined that fossils known as conodont elements do not have paleontological interest under the meaning of the PRPA and therefore will not be managed as paleontological resources. Conodont fossils discovered on public lands are still subject to preservation and management under other statutes that apply to those lands.

Determination by:

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Date

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