Atlantic Geoscience

DETAILED GUIDE FOR AUTHORS AND EDITORIAL POLICIES

(Updated August 2026)

Publication of your paper will be facilitated if you follow the policy guidelines itemized below. Please note the reference format in particular. For examples, refer to recently published articles but note that the published version differs in some respects from what you are asked to submit.

For submission, please provide a Word file of the text only and a single PDF of the entire manuscript (text followed by figures and tables). Individual figures and tables will be requested after the paper has been reviewed, revised, and accepted.

On submission please also provide the names of at least three potential reviewers (on the submission website, this information is provided in the space called "Author Comments").

DURING SUBMISSION

After uploading your paper, be sure to enter the metadata for **all** authors including, at a minimum, name and e-mail access.

GENERAL MANUSCRIPT FORMATTING

1. The country name appears after the postal code or zip code.
2. List all authors together followed by addresses (each on a new line). Superscripted numbers should be used to indicate the address for each author, if different.
3. Provide an email address for the corresponding author.
4. Organization contribution numbers, if applicable, should be given in the acknowledgements.

ABSTRACT

5. Format as a single paragraph.
6. Abstract should have 300 words or fewer.
7. Except for SI abbreviations, no abbreviations are permitted in the abstract.
8. No literature citations, footnotes or taxon authorships are permitted in the abstract.
9. As the abstract will provide the only contact you have with many readers, provide information, not a list of things you have done: i.e., avoid phrases such “we discuss”, “we record”, "we observed", or their passive equivalents.

OVERALL LAYOUT

10. Set in a standard font (Times New Roman 12 pt. is preferred).
11. Text should be left-justified only (not fully justified), except for titles, authors list and headings, which are centred.
12. Use correct symbol for degrees: 25° [not 25º (superscript letter “O”) or 25^0 (superscript number “0”)].
13. Correct format: e.g., / i.e.,/ cf. / ca. /vs./sensu stricto (No italics.).
14. In references cited in text:

    Do not put a comma between author and year for references, figure captions and appendices. (e.g., Smith 1997).

Separate a list of papers by different authors with a semicolon. (e.g., Smith 1977; Watkins et al. 1979). Separate papers by the same author or authors with a comma. (e.g., Woods 1994, 1997a) For references by the same author in the same year, use lower case letters separated by a comma (e.g., Smith1997a, b).

HEADINGS

15. Do not number headings.
16. Please follow this heading style:

First-order: Boldface, all upper case, centred, 14 pt.
Second-order: Boldface, lower case. centred, 12 pt.
Third-order: Italics or underline, lower case, flush left, 12 pt.
Fourth-order: Italics or underline with colon, lower case, run-on with single paragraph, 12 pt.
Second to fourth order headings without initial capitals except for first word and proper nouns

ABBREVIATIONS, NUMBERS AND UNITS

17. Reduce the number of abbreviations (acronyms) for rock units or geological features used in the text to one or at the most two. All other abbreviations must be spelled out in the text, except when making reference to figures on which the abbreviations are used, for example "... (TBF and HGF in Fig. 3)".
18. Use metric measurements. (If non-metric measurements are absolutely necessary, for example in quotations, also provide a conversion).
19. Use correct abbreviation s (e.g., lowercase s, min, h, cm, m, km, etc., not sec, hr, Km, KM, etc.) in the text, tables, and figures.
20. Leave a space between a number and its unit (e.g. 5 cm, not 5cm).
21. If the word metre (or derivative, such as kilometre) needs to spelled in full, use Canadian spelling (metre), not meter. The same applies to litre, etc.
22. Use MPa or GPa in preference to kbar or cite both.
23. Use Ga and Ma for "billion years ago" and "million years ago", respectively, and Gyr and Myr for "billions of years duration" and "millions of years duration", respectively; for example, "The Cretaceous period ended 66 Ma and lasted 80 Myr". Similarly, ka is "thousand years ago" and kyr is thousands of years duration. Authors should report the level of confidence for the date, and the meaning of the uncertainty (analytical precision, internal error, external error).
24. If using BP, authors should define their definition of "present". Cite dates in the following format; 2354 BP (no space or punctuation except a space before BP) or for ages greater than 9999 years 11 324 BP or 11 324 + 1234 BP (no punctuation, space between the thousands and the hundreds). If using historical dates, use "common era" terminology, i.e., CE instead of AD and BCE for BC: for example, 1066 CE rather than AD 1066 and 44 BCE instead of 44 BC.
25. Add zeros before decimal point for values less than 1 in text, tables, and figures. (e.g., 0.2, not .2)
26. Do not abbreviate generic names of species: e.g., *Gonyaulacysta jurassica*, not *G. jurassica*, even in repeated uses; an exception is in compound names such as *Gonyaulacysta* cf. *G. jurassica*,

HYPHENS, DASHES, AND QUOTATIONS

27. Hyphens (-) are links between closely associated words, especially adjectival phrases, such as grey-green shale, well-known site, cross-bedding. N-dashes (–) stand in for the words "to" or in some cases "and": 26–30 cm, Jurassic–Cretaceous strata. If elements on either side of an n-dash are compound, use a spaced n-dash (e.g., Late Jurassic – Early Cretaceous) or (better) substitute the n-dash with the word "to". M-dashes (—) are major pauses in a sentence, used to convey emphasis or separation (e.g., "The granites of Nova Scotia — an amazing history").
28. Use single quotes only within double quotes

ACKNOWLEDGMENTS
29. Spell out the names of funding sources such as the Natural Sciences and Engineering Research Council or the Ontario Geological Survey.
30. Unless there is a reason to do otherwise, lists in the acknowledgements should be alphabetized and names rendered in a consistent manner: e.g., Joe Bloggs and Fred Smith OR J. Bloggs and F. Smith, BUT NOT Joe Bloggs and F. Smith.
31. Omit honorifics (Mrs., Dr., Prof., Sir, etc.).

CHRONOSTRATIGRAPHIC NAMES. Use initial upper case for formally recognized epoch rank and above units in the Geological Time Scale and lower case for informal uses: e.g. Early Cretaceous and Middle Jurassic, but middle Cretaceous. Use "middle" or "Middle", not "mid-" or "Mid". All subdivision of units at stage level or below should use lower case initial letters, e.g. early Albian, whether formal or not. There is no obligation to use the word "age" or "time" in association with a chronostratigraphic term.

REFERENCE LIST (Atlantic Geoscience EXAMPLES are included at the end of this document). Keep in mind that the purpose of a reference list is for location and retrieval in the literature; it is not necessarily an exact quote of the original title, etc., in terms of capitalization, font, etc. IF YOU USE and automated reference generator such as ENDNOTE, please turn it off in the WORD document that you submit. These automated systems do not properly format references for most journals or put them in the correct order. See detailed instructions below. Thank you.

The date of formal publication is that of the first appearance of a finally laid out version whether as a PDF online or in print. A downloaded PDF of an article will commonly indicate when it was first issued online and, if the year indicated for online issue is in conflict with the year indicated for the print/whole volume issue, <u>the earliest date</u> (usually the online date) should be used. This consideration is especially critical for publications that contain new taxa.

Do not include doi citations in references; these citations will be added at the layout stage.

32. Set Authors' names in lower case, NOT all capitals.
33. The entire manuscript, <u>including</u> references and figure captions, should be double spaced and, if possible, lines subsequent to the first line in references should be indented.
34. Do not leave a blank line or extra spacing between references.
35. Do not put a comma after initial of final author and before date.

36. No abbreviations other than the authors' initials, except for standard abbreviations of countries, provinces, and states after a publisher's name; abbreviations used in the original titles of works; and names of academic degrees.
37. In titles of articles and books, use upper case for the very first letter of the article/book title and proper nouns only. Journal titles should be spelled in full, with no abbreviations.
38. In successive references by the same author(s), repeat the name of each author; do not use a line.
39. Use "and", not "&", between last two authors' names.
40. Use initials, not given names, of authors (e.g., Smith, M., not Smith, Michael).
41. Separate multiple authors' names with a comma, not a semi-colon.
42. Insert a comma before the "and" in the list of authors only if more than two authors.
43. References with numerous authors should have at least the first ten authors listed, followed by "et al." but list all if you prefer. [Note the period is after al., not et]
44. For papers in books, use "*In* Title. *Edited by* A.N. Others" as in example on page 5.
45. Include the total number of pages in books, theses, memoirs, etc., and in articles in journals that do not use running (continuous) page numbers.
46. Do not include personal communications or manuscripts not yet formally accepted (not "in press") in the reference list. Designate such unpublished work in the appropriate place in the text, for example: (J. Bloggs, unpublished data) or (J. Bloggs, personal communication 1999).
47. References must be listed according to the name of the first author and not numbered. References with the same first author are listed in the following order: (1) papers with one author only are listed first, in chronological order, beginning with the earliest paper; (2) papers with dual authorship follow and are listed in alphabetical order by the last name of the second author; for references by the same two authors list in chronological order; (3) papers with three or more authors appear after the dual-authored papers and are arranged chronologically. The following list indicates the correct order for references with the same first author:
Green, G. 1970.
Green, G. 1976.
Green, G. and Brown, B. 1981.
Green, G. and Brown, B. 1994.
Green, G. and White, W. 1969.
Green, G., White, W., and Brown, B. 1969.
Green, G., Smith, S., and White, W. 1972a
Green, G., Brown, B., and White, W. 1972b
48. St. John is ordered between "ss" and "su", not as if it were spelled "Saint"
49. There must be a one to one relationship between authorships of references in the text and those in the references. For example, van Ameron (1944) should appear as Van Ameron (under "v") in the references, not as Ameron (under A). Ameron (1944) in the text and "Ameron, B.W., van" in the references would also be acceptable.
50. In the reference list, and at the start of a sentence in the text, capital letters should be used (e.g, Van Ameron, not van Ameron).

TABLES [Excel files are much preferred]
51. A separate list of table captions is not needed.
52. Table title should appear at the top of each table.
53. Explanatory material should appear in notes at the bottom of the table, not in the caption.

54. Tables should not contain vertical lines.
55. Prepare tables so that it is obvious how you want them to look in the Journal.

PALEONTOLOGY PAPERS: SPECIAL INSTRUCTIONS
56. Use consistent and correct style for authorships of taxon names. In general, we prefer such authorships to be omitted from the text and listed in an Appendix. If it is felt necessary to include such authorships in the text, the authors name(s) and year must be given in full. References should be given in the reference list for all taxon authorships that are in the text.

PAPERS WITH NEW FORMAL LITHOSTRATIGRAPHY
57. Papers with new or revised lithostratigraphic units should be accompanied by an Appendix with a Lexicon-style entry for each new or revised unit. Before formally designating a new lithostratigraphic name, check that the name is not pre-occupied by referring to the Lexicon of Canadian Geological Names on-line:
http://weblex.nrcan.gc.ca/weblexnet4/weblex_e.aspx

FIGURES (in text/captions)
58. Use "Figure." unless it is used in parentheses; then use "Fig."
59. When referring to multiple figures, use "Figures" or "Figs." to identify multiple parts of figures: e.g., Figures 8a–b (in body of text) or (Figs. 8a–d).
60. Use lower case "f" when referring to figures in other works.
61. Include a separate list of figure captions at the end of the manuscript (i.e. after any appendices).
62. Double space figure captions.
63. Do not leave a blank line or extra spacing between captions.
64. Do not put captions on figures (that step is done during layout).
65. Define all abbreviations used in figures in corresponding figure captions.

FINAL FIGURES
66. Figures in CorelDraw format are preferred but Adobe Illustrator files are acceptable.
67. Halftone or photographic plates should be scanned and submitted in high-resolution pdf format.
68. Figures should be designed so as to fit effectively into the publication space — one column figures should 3.5" (8.75 cm) wide; full page width figures should be 7.25 (18.1 cm) wide. Figures can be no longer than 9.5" (24 cm).
69. The Journal does not publish numbered plates. Renumber plates as figures, appropriately in sequence.
70. Lettering in figures should be in a sans serif font (e.g., Arial). Fonts must be no smaller than 6 pt at final figure size.
71. Make font style and size, thickness of lines, and patterns consistent throughout all figures.
72. Remove "hairlines". Minimum line thickness should be ca. 0.1 mm.
73. For legibility, pattern repeat interval should be no less than 0.25" (7 mm).
74. Label components of Fig. (a), (b), (c), etc., not A, B, C, etc. Components must be provided at the same scale if they are to be combined during layout. Parentheses should be omitted when referring to Figures in the text; e.g., "see Fig. 4a", not "see Fig. 4(a)".
75. Remove shadows around boxes.

76. All maps should have either latitude and longitude or UTM ticks (at least two in each direction). If using latitude and longitude, include N, S, E or W and degree symbol.
77. In general, put symbols in a separate legend.
78. Line art prepared electronically can be submitted in most file formats (cdr, ai, pdf) though CorelDRAW (cdr format) is preferred.
79. Hand-drawn line art illustrations should be submitted in pdf format.

ATLANTIC GEOSCIENCE REFERENCE STYLE (EXAMPLES)

Journal article:

Hyndman, R.D., Yorath, C.J., Clowes, R.M.., and Davis, E.E. 1990. The northern Cascadia subduction zone at Vancouver Island: seismic structure and tectonic history. Canadian Journal of Earth Sciences, 27, pp. 313–329.

Ohmoto, H. 1986. Stable isotope geochemistry of ore deposits. In Stable isotopes in high temperature geological processes. Edited by J.W. Valley, H.P. Taylor, and J.R. O'Neil. Reviews in Mineralogy, 16, pp. 491–560.

Walker, R.G. 1984. Turbidites and associated coarse clastic deposits. *In* Facies models. 2nd edition. *Edited by* R.G. Walker. Geoscience Canada, Reprint Series 1, pp. 171–188.

Ingrams, S., Jolley, D.W., and Schneider, S. 2021. High latitude stratigraphical palynology of the Jurassic–Cretaceous boundary interval, Sverdrup Basin, Arctic Canada. Cretaceous Research, 126, 104922, 15 p.

NOTE: the correct publication date for an article is the date when it appears fully laid out (in its final form) online (the "version of record"); this may be earlier than in the journal's later citation for the article. This procedure is critical for works containing new taxon names.

Book:

Billings, M.P. 1972. Structural geology. 3rd edition. Prentice-Hall, Inc., Englewood Cliffs, N.J., 421 p.

Keppie, J.D., Nance, R.D., Murphy, J.B., and Dostal, J. 1991. Northern Appalachians: Avalon and Meguma terranes. *In* Tectonothermal evolution of the west African orogens and circum-Atlantic correlatives. *Edited by* R.D. Dallmeyer and J.P. Lécorché. Springer-Verlag, Heidelberg, pp. 298–315.

Paper in conference proceedings:

Dickenson, W.T. and Wall, G.J. 1978. Temporal and spatial patterns in erosion and fluvial processes. *In* Research in Geomorphology. Geo-Books, Norwich, U.K., pp. 133–148. Institutional publications:

Robson, M.J. 1985. Lower Paleozoic stratigraphy of northwestern Melville Island, District of Franklin. *In* Current research, part B. Geological Survey of Canada, Paper 85-1B, pp. 281–284.

Heaman, L.M. 1988. A precise U-Pb zircon age for a Hearst dyke. Geological Association of Canada-Mineralogical Association of Canada, Program with Abstracts, 13, p. A53.

Teller, J.T. and Clayton, L. *(Editors)*. 1983. Glacial Lake Agassiz. The Geological Association of Canada, Special Paper 26, 43 p.

Thesis:

Van de Poll, H.W. 1970. Stratigraphical and sedimentological aspects of Pennsylvanian strata in southern New Brunswick. Unpublished Ph.D. thesis, University of Wales, Aberystwyth, Wales, 194 p.

Map:

Barr, S.M., White, C.E., and Macdonald, A.S. 1996. Geology, southeastern Cape Breton Island, Nova Scotia. Geological Survey of Canada, Map1853A, scale 1:100 000.

Internet Data and Websites:

Reference to electronic documents posted on internet web sites should include the date the information was posted (publication date), as well as the date of access or downloading of the information. Environment Canada. 2002. The climate of Nova Scotia. URL <http://www.alt.ec.gc.ca/climate/ns.html>, 6 January 2003.

NOTE: It is strongly recommended that internet documents be downloaded as digital files by an author if they are used as references. This will ensure that you at least have a copy of the original work regardless of any changes at the originating site.

Note:

Reference in text for articles appearing in same issue should be cited: e.g., (Davis and Green 1999). In reference list: Davis, D.W. and Green, J.C. 1999. Title of article. Atlantic Geology, 36, pp. XXX–XXX. (We will fill in page range later).

Style for Systematic Paleontology (see example in Appendix A)

Follow the relevant nomenclatural code — the International Code of Zoological Nomenclature (http://iczn.org/iczn/index.jsp) for zoology, including ichnology; and the International Code of Nomenclature (http://iapt-taxon.org/nomen/main.php) for algae, fungi and plants.

The term "Systematic paleontology" should be used as a First order heading in place of "Taxonomy" For other headings in a systematic section, see example.

Note that we do not use commas between author and year for any references, whether in general text or for a taxon authorship (even though the ICZN recommends use of such a comma).

ATLANTIC GEOSCIENCE PREFERRED USEAGE SUMMARY

Only use single quotes within double quotes

Avoid: (1) starting sentences with "There is...." Or similar constructions (weak writing); (2) using adjectives as nouns (volcanics should be volcanic rocks); (3) using constructions like "This means that..." instead of "This result means that...". brackets [ ] as in [( )] can almost always be avoided through judicious use of commas and hyphens

Appalachian orogen, not Appalachian Orogen

archaeology (by international convention), not archeology, although paleontology rather than palaeontology

Arctic, as in the Canadian Arctic

arctic, as in arctic Canada

bivalve (modern convention), not pelecypod or lamellibranch

centre, not center

coalfield

cross-section

dates: preferably 12 November 2004 (progressing logically from smallest to largest unit) rather that November 12 2004 (progressing illogically from middle sized unit to smallest to biggest)

dyke, not dike

earth, as in “they threw earth all over it ....”

Earth, as in “the Earth is one of the planets of the Solar System”

equator, as in “the equator of any sphere forms a circle ....
”

Equator, as in “the country of Equador was so named because it is on the Equator”

foraminifera is preferred as a vernacular plural for foraminifer

freshwater, as in “this is a freshwater river rather than a tidal river” (cf. saltwater)

fresh water, as in “there is fresh water in the river” (cf. salt water)

full moon

Greenwich Meridian

groundwater (noun and adjective)

ibid, avoid. Use reference again or if doesn't need repeating, just use author's name.

ice age, not capitalized, could be a Precambrian ice age, or a Carboniferous ice age.

Ice Age, capitalized, means the ongoing Pleistocene–Holocene episode (global warming notwithstanding), and can be subdivided into glacials and interglacials.

idem, avoid. Use reference again or if doesn't need repeating, just use author's name.

landmass

macroflora,, not megaflora

Magnetic North Pole

Magnetic South Pole

Maritime Provinces — a compound noun referring to a region, but the "Maritime provinces of New Brunswick and Prince Edward Island"

metre, not meter

Middle/middle, not Mid- or mid-

moon, as in one of the moons of Jupiter

Moon, as in the Moon is a satellite of Earth; but full moon, new moon, first quarter of the Moon

Northern Hemisphere (of the Earth)

North Pole

oxidize, not oxidise, etc.

paleo..., not palaeo...

Paleocene, not Palaeocene

Post-glacial

Pridoli – not Přidolí,

[first or last] quarter of the moon

red beds, not redbeds

saltwater, as in “here is a saltwater creek”

salt water, as in “the sea is composed of salt water”

Scotian Margin (= Scotian Shelf + Scotian Slope) or use Scotian Shelf and Scotian Slope sensu stricto.

sea level (noun),

sea-level (adjective)

semi-diurnal

Southern Hemisphere (of the Earth)

South Pole

storey, as in multistorey sandstone packages

Sun (in reference to the Solar System’s star)

terrane, not Terrane

Visean, not Viséan

Appendix A: SYSTEMATIC PALEONTOLOGY

Division **Dinoflagellata** (Bütschli 1885) Smith *et al.* 1993

Subdivision **Dinokaryota** Smith *et al.* 1993

Class **Dinophyceae** Pascher 1914

Subclass **Peridiniphycidae** Smith *et al*. 1993

Order **Gonyaulacales** Taylor 1980

Suborder **Gonyaulacineae** (autonym)

Family **Areoligeraceae** Evitt 1963b

Genus ***Aptea*** Eisenack 1958 emend. nov.

1958 *Aptea* Eisenack, p. 393.

1967 *Cassidium* Drugg, p. 22.

Type. Eisenack 1958, pl.22, fig.5, as *Aptea polymorpha*.

Emended Diagnosis. Areoligeracean cysts that are proximate to proximochorate, with a subcircular to lenticular ambitus, a rounded to more commonly asymmetrical antapex and an apical horn; lateral horns or prominences formed by the central body are absent, although a lateral prominence may be formed by ornament. Acavate. Ornamentation consisting of linear elements such as crests or ridges, or short to moderately long free-standing elements that are in large part fused or connected to adjacent elements; ornament is more or less uniformly distributed over the cyst. Archaeopyle apical, with formula $A_{(1\text{-}4')}$, operculum free; sulcal notch offset to the left.

Comments. As expressed above, *Aptea* is here considered an areoligeracean genus and not, as determined by some authors, a taxonomic junior synonym of *Pseudoceratium*. It is distinguished by ornament that is entirely of for the most part composed of linear elements, and this ornament is not absent dorso-ventrally although it may be reduced. *Cyclonephelium* also has

predominantly linear sculptural elements but has dorso-ventral areas devoid of ornament.

Aptea cassis sp. nov.

(Fig. 5a–n)

Holotype. Fig. 5C, from the base of the Slater River Formation (late Albian or Early Cenomanian), Hume River section, Northwest Territories, Canada. (Sample 07-Peel-43, 724.5 m from base of section, slide 5262-012C, coordinates 190x0909, England Finder XXXX; see Appendix herein and Fensome 2016 for further details.)

Derivation of name. From the Latin *cassis*, meaning hunting net or snare, in reference to the reticulate nature of the ornament. The epithet is a noun in apposition.

Diagnosis. A species of *Aptea* with a coarse reticulum formed of simple low membranous crests; there are no free-standing elements. The reticulum is distributed across the dorsal and ventral surfaces, although may occasionally be somewhat more weakly developed in mid-ventral and mid-dorsal areas. The antapex is symmetrical or asymmetrical, with developments of two usually unequal antapical protuberances or horns.

Comments. This species is characterized by a simple network of low crests; the ornament is not complicated by additional convoluted or free-standing elements. The ornament of *Aptea polymorpha* tends to be higher and more convoluted. *Aptea cassis* also resembles *Cyclonephelium compactum*, but the latter has distinct dorso-ventral areas devoid of ornament and higher and generally more convoluted muri.

Stratigraphic occurrence. This species occurs in the lower part of the Slater River Formation on the Mackenzie Plain, previously dated as early Cenomanian based on rare ammonites, fish scale and lithologic correlation, but dated as latest Albian based on dinoflagellate cysts (Fensome 2016).

Aptea rotundata (Cookson & Eisenack 1961) comb. nov.

1961 *Canningia rotundata* Cookson & Eisenack, p. 72, pl. 12, figs. 1–5.

1962 *Cyclonephelium paucimarginatum* Cookson & Eisenack, p. 494, pl. 6, fig. 5–7.

1978 *Canningia*? *rotundata* Cookson & Eisenack: Stover & Evitt, p. 25.

1980 *Batiacasphaera rotundata* (Cookson & Eisenack) Dörhöfer & Davies, p. 41.

1987a *Circulodinium vermiculatum* Stover & Helby, p. 230, figs. 4A–M.

Comments. Cookson & Eisenack (1961, p. 72) described this species as having a wall '…of variable thickness, *c* 2–5 μ, closely covered with a dense indistinctly vermiculate pattern.' The wall is thus single layered, with ornament of linear elements, and so fits with *Aptea* rather than *Canningia*. Although the epithet implies a bowl-shaped body, the holotype is asymmetrical, attesting to its areoligeracean affinity.

Stratigraphic occurrence. Cookson & Eisenack (1961) recorded *Aptea* (as *Canningia*) *rotundata* from the Senonian of Australia. (The term 'Senonian' is former term for a Late Cretaceous epoch generally considered Coniacean–Campanian but sometimes defined as including the Maastrichtian — http://www.encyclopedia.com/science/dictionaries-thesauruses-pictures-and-press-releases/senonian — we are uncertain as to the definition applied by Cookson and Eisenack.) Cookson & Eisenack (1962) described *Cyclonephelium paucimarginatum* from the ?late Albian–Cenomanian of Australia. The type material of *Circulodinium vermiculatum* is from the late Hauterivian to Barremian of offshore Western Australia.

Genus *Canningia* Cookson & Eisenack 1960

1960 *Canningia* Cookson & Eisenack: 251.

1967 *Senoniasphaera* Clarke & Verdier: 61.

1980 *Canningia* Clarke & Verdier; emend. Dörhöfer & Davies, p. 36.

1980 *Hashenia* Yu Jingxian & Zhang Wangping: 107.

1981 *Canningia* Clarke & Verdier; emend. Below, p. 30 (however, see Hedlund & Norris 1986, p. 295).

1987 *Canningia* Clarke & Verdier; emend. Helby, p. 321–322.

Type. Cookson & Eisenack 1960, pl. 38, fig. 1, as *Canningia reticulata*.

Synopsis. Areoligeracean cysts that are proximate, lenticular, with asymmetrical to rounded antapex and a generally short apical prominence. Holocavate; the connections between autophragm and ectophragm may be in the form of membranes (muri) or unit elements (pillars). Ectophragm continuous or discontinuous, generally smooth or with ornamentation of low relief. Archaeopyle apical, with formula $A_{(1\text{-}4')}$, operculum free or attached; sulcal notch offset to the left.

Family **Ceratiaceae** Willey & Hickson 1909

Genus ***Pseudoceratium*** Gocht 1957 emend. nov.

1957 *Pseudoceratium* Gocht, p. 166.
1962 *Eopseudoceratium* Neale & Sarjeant, p. 446.
1980 *Pseudoceratium* Gocht; emend. Dörhöfer & Davies, p. 39.
1986 *Pseudoceratium* Gocht; emend. Bint, p. 144.
1987 *Pseudoceratium* Gocht; emend. Helby, p. 313–315.

Type: Gocht 1957, pl. 18, fig. 1, as *Pseudoceratium pelliferum*.

Emended diagnosis. Dorso-ventrally compressed ceratiacean cysts with single apical, lateral (postcingular) and antapical horns or prominences; the lateral horn is formed from the autophragm, not by the ornament alone. Proximate, wall formed of one or two layers. If two-layered, there are supports between the layers, which are thus autophragm and ectophragm. Paratabulation often indicated by ornamentation if present. Ornamentation may be granular or consist of short processes, which may be joined by trabecula or support a more extensive ectophragm. Archaeopyle apical, with formula $A_{(1–4')}$, operculum generally free; sulcal notch offset to the left.

Comments. We emend *Pseudoceratium* to restrict it to forms in which the lateral horn/prominence if formed by the autophragm. Forms in which the lateral prominence is constructed solely from the ornament are referable to an areoligeracean genus, most commonly *Aptea*.

Pseudoceratium aulaeum Harding 1990 ex Harding in Williams *et al*. 1998

1990 *Pseudoceratium aulaeum* Harding, p. 18, pl. 1, figs. 1–6; name not validly published.

1998 *Pseudoceratium aulaeum* Harding ex Harding in Williams *et al*. 1998, p. 512.

Comments. This species is difficult to compare with other species of *Pseudoceratium* because the type material is illustrated by scanning electron micrographs (SEMs). Paratabulation is evident on the SEMs. Harding (1990, p. 18) noted that the 'Intratabular sculptural elements consist of irregularly distributed processes supporting an ectophragmal trabecular reticulum.'

Stratigraphic occurrence. Harding recorded this species from 'presumed low-salinity' late Barremian assemblages of England.

Suborder **Gonyaulacineae** Smith *et al*. 1993

Family **Gonyaulacaceae** Lindemann 1928

Subfamily **Cribroperidinioideae** Fensome *et al*. 1993

Genus ***Turbiosphaera*** Archangelsky 1969

1969 *Turbiosphaera* Archangelsky, p. 408.

Selected species

Turbiosphaera*? *sarrisii (Archangelsky 1969) comb. nov.

1969 *Polystephanephorus*? *sarrisii* Archangelsky, p. 411, pl. 2, figs. 5–7.

1978 *Senoniasphaera*? *sarrisii* (Archangelsky) Stover & Evitt, p. 80.

Comments. Archangelsky (1969) considered that this species has an apical archaeopyle. However, G. R. Guerstein (personal communication 2017) noted that a restudy of the type material confirmed that this species has a precingular archaeopyle. Following suggestions by Archangelsky (1969), Gonzalez Estebenet *et al*. (2015, 2016) considered *Senoniasphaera sarrisii* to be an extreme member of the *Turbiosphaera filosa* complex (their morphotype 1). These authors considered the morphological variation within the *Turbiosphaera filosa* complex to parallel the variation described by Benedek & Gocht (1981 and references therein) and Pross (2001) for *Thalassiphora pelagica*. However, Gonzalez Estebenet *et al*. (2015, 2016) made no formal taxonomic proposals, so for now we tentatively transfer *Senoniasphaera*? *sarrisii* to *Turbiosphaera*.

Stratigraphic occurrence. The type material is from the Eocene of Argentina.