

A Manual for Authors
of the
Treatise on Invertebrate Paleontology

Updated, 2024

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INTRODUCTION

From the outset, the aim of the *Treatise on Invertebrate Paleontology* has been to present a comprehensive and authoritative yet compact statement of knowledge concerning groups of invertebrate fossils. New sources of information and new tools for analysis, however, have broadened the scope of the venture. Documentation of taxa in the literature has increased, and the manner of documentation has changed. Moreover, technological improvements continue to alter the ways in which text and illustrations are processed. This manual is intended to aid *Treatise* authors and coordinators by supplementing the examples found in recently published volumes of the *Treatise* and *Treatise Online*.

Most volumes are prepared by a group led by one paleontologist who coordinates preparation of manuscript and selection of illustrations. Although some conformity is necessary, authors are given as much freedom as possible to express judgment on taxonomy, classification, morphological terminology, phylogenetic relationships, evolutionary trends, and similar matters. Where controversy exists, either within or outside the group producing the volume, concise statements of differing views are appropriate for inclusion in the *Treatise*.

Authors are encouraged to organize the material in their part of the *Treatise* as thoroughly and objectively as possible. They select the illustrations, arrange the figures, and prepare a draft of the text. In arranging materials, each author should conform to the style described in this manual in order to maintain general uniformity. It is the responsibility of the staff of the Paleontological Institute to aid coordinators and authors during preparation of manuscript and figures.

The responsibility for thoroughness in all phases of the work rests with authors. Firm designation of generic names and of type species of genera is essential. Sound judgment is also essential in the preparation of diagnoses; in the discussion of classification, morphology, and evolution; and in the selection of informative illustrations. *Treatise Online* is now open access, an exciting development that opens up our work to a far greater audience. As such, we now think of each “chapter” as an “article” rather than a chapter. This allows far more flexibility, but also the responsibility for each article to stand alone on its merits. In this manual we are using the word “article” in place of chapter. At the end, this collection of articles becomes a book (or volume) in our series. We will continue to use the term “volume” here, although “finished work” might be more accurate, since it can take various forms. When all articles are in, they will be compiled into a volume or set of volumes, as we’ve always done, and be made available as pdfs online. Print on demand options will be made available.

The following instructions and suggestions are intended to answer some of the questions that may arise as authors prepare text and illustrations for the *Treatise*.

GENERAL STYLE

Language. All text in the *Treatise* is written in or translated into English (using American English spelling). We strive first for clarity of expression, second for brevity. Both are more easily achieved when sentence structure is kept simple and diction plain. The authority for spelling, hyphenation, and such matters is the unabridged *Webster’s Third New International Dictionary of the English Language*, unless superseded by its chief abridgment, the more frequently revised *Merriam-Webster’s Collegiate Dictionary, 11th Edition*. Recommended style manuals are the latest version of *Chicago Manual of Style* and the U.S. Geological Survey’s *Suggestions to Authors*.

Abbreviations and symbols. Except for such standard items as units of measure, abbreviations and symbols are to be avoided in *Treatise* manuscript and illustrations. Any author who finds the use of abbreviations or symbols unavoidable, such as for the notations of bivalve dentitions or echinoderm plates, must provide spelled-out equivalents and clear definitions.

Taxon Authorship. In all introductory text, any genus or species name that appears must be identified with its naming author and date at first mention in the manuscript and whenever used in a figure caption (this rule was newly applied to genera as well as species as of 2015). [Example: specimens of *Psigraptus* JACKSON, 1967; *Sphenoecium obuti* (DURMAN & SENNIKOV, 1993)]. The rule for genera may be waived by agreement with the editor for short introductory text in a systematic article in which the taxon is later identified. However, any species must still be identified when first mentioned. (Note: DURMAN & SENNIKOV, 1993 is in parentheses in the second example to signify that they did not specify a type species at the time of naming. Do not use parentheses in an authorship identification unless this is the case.)

Citations. It goes without saying, that whenever paraphrasing other researchers work, citing their names is very important. *Treatise* is in fact a compendium of known knowledge in various fields of invertebrate paleontology, so a typical manuscript will contain many such citations. In this age of easy and (sometimes unintended) plagiarism, all publications must be diligent. Software that searches for plagiarism will at some point become standard practice for all publications.

Citing multiple authors. Please list all authors up to three. For four or more, list first author “and others.” Within a taxon authorship identification or for a source cited in parentheses, use “& others.” All authors are listed in the References section in the order in which presented in the original document.

Past tense. Use past tense for descriptions of previously published authors’ ideas. [BULMAN (1945) described the proximal development of *Dicranograptus nicholsoni* HOPKINSON, 1870 from isolated...].

Quotation marks. Do not use quotation marks—either single or double—when introducing terms or to mean so-called. *Treatise* reserves quotation marks for actual quoted material or when used for a specific nomenclature purpose, such as single quotes to denote an obsolete species. Quotation marks used for emphasis are confusing as they imply a hidden meaning that may not be clear to the reader. In these cases, any meaning you have in mind should be fully explained, such as explaining that the term is new or not fully recognized. If relevant, add “so-called.” In the following examples, quotation marks were deleted around “periostracum” and “root system,” and “so-called” was added in the second example. [GRAY (1833) proposed the term periostracum for the layer secreted at the margin of a mollusk shell....] [In benthic graptolites, there is no credible evidence of any so-called root system extending into the sediment...]. In each case, the meaning is clear. When actually quoting material, please clearly cite source and page number.

Text styles. *Treatise* manuscripts consists of text, references, figure explanations, and tables. Footnotes are not allowed. Please indicate levels of headings by placing <1>, <2>, <3>, etc. beside heads and subheads throughout your manuscript. This helps editors apply our style, which can vary. Styles for taxon descriptions are detailed on p. 8. Figure explanation style is on p. 11 and in examples on p. 16–20.

Submission of manuscript. Authors are urged to submit manuscript and figure files by upload to the Paleontological Institute Dropbox. Email paleo@ku.edu for an invitation to a part-specific folder in our Dropbox. Our office can advise you on setting up a personal Dropbox if your institution

does not offer one. This site is also used to transmit page proofs back and forth between authors and editors, so it's important to obtain access to an institutional or personal Dropbox so you can easily connect with us. You may also use other file-sharing programs, such as WeTransfer, with prior approval from Paleo Institute staff. For manuscripts, we prefer Microsoft Word (either PC or Macintosh format) but our conversion program allows us to translate files from most commonly used word-processing programs. Authors should retain an electronic copy of their submission for their files. We strongly encourage authors to contact the editorial office for assistance if they have any questions.

OUTLINE OF THE TREATISE VOLUME

Before submitting the first manuscript, a detailed outline for a systematic, coordinated treatment of the subject must be submitted by the coordinating author and approved by the Treatise editors. Because the outline determines the final organization of a volume, it should be as specific and detailed as possible. For example:

- Introduction
- General features of the Brachiopoda
 - General morphology
 - Recent Brachiopoda
 - Skeletal morphology
 - Glossary of morphological terms
- Special aspects of study unique to the Brachiopoda
- Evolution, ecology, and distribution
 - Evolution of the Brachiopoda
 - Ecology and paleoecology of the Brachiopoda
 - Biostratigraphic distribution of the Brachiopoda
 - Biogeography and paleobiogeography of the Brachiopoda
- Classification
 - Historical review of classification of the Brachiopoda
 - Classification of the Brachiopoda
- Systematic descriptions
- Abbreviation for Museum Repositories (cited in figure captions)
- References

The overall outline may vary somewhat among *Treatise* volumes since the study of each major group of invertebrate fossils is likely to be characterized by special areas of emphasis.

It's useful to submit a second outline that divides the material into individual articles for *Treatise Online* even if the finished work will not be organized in that fashion. The outline should include the names of authors who are responsible for each section/chapter. This functions as the guide to article titles and numbers for *Treatise Online*. Chapters (as articles) are published as they are finished and are unlikely to appear in sequential order.

SECTIONS ON MORPHOLOGY AND RELATED TOPICS

Structural features. Descriptions of structural features or skeletal parts characteristic of a fossil group or the anatomy and ontogeny of its modern representatives should be presented in the first part of the section dedicated to the group. Part T, Echinodermata 2, for example, includes in this section chapters on recent crinoids and on the skeletal morphology, microstructure, and postlarval

ontogeny of fossil forms. Additional discussion of morphology may be included under some of the main systematic subdivisions (e.g., Fusulinacea, Part C, Protista 2). It is not desirable, however, to divide the discussion of morphology into too many units.

Morphological features. Descriptions of morphological features of fossils should make clear the essentials of skeletal organization in the taxa concerned. It is not possible to formulate general rules for handling such subject matter. In dealing with some features—for example, the cystoid advective system—it is neither necessary nor desirable to try to illustrate all known variations in form and placement. Description and illustration of selected, typical representatives are sufficient, especially if supplemented by a brief summary of the variation.

Glossary of terms. Morphological terms should be defined concisely in a glossary. The glossary should indicate terms that are recommended for continued use and terms that are obsolete and recommended for disuse (terms recommended for disuse should be shown in italic). Because readers of the *Treatise* need to be able to access the older literature, the glossary must provide meanings of terms recommended for disuse, typically by referring to a recommended synonym.

Illustrations of features. All morphological features should be adequately illustrated. Simple diagrams are preferred. A single illustration should not be used to convey too many ideas. The clear illustration of morphological features may sometimes justify the use of several figures. More detailed information on the preparation of illustrations is on p. 13–20 and Appendix 1 (p. 22).

SECTIONS ON EVOLUTIONARY TRENDS, ECOLOGY AND PALEOECOLOGY, BIOSTRATIGRAPHY AND BIOGEOGRAPHY, AND PALEO GEOGRAPHY

The evidence for evolutionary trends in each invertebrate group should be summarized. The paleontological evidence for different groups is not equal, and discussions may vary widely in length and in depth of treatment. Viewpoints are often subjective, and divergent interpretations of the evidence by different specialists are altogether acceptable. The contents and organization of the sections on paleoecology, biostratigraphy, and paleobiogeography can be expected to vary widely among groups of organisms. Ecology and paleoecology provide the stage on which the evolutionary play is acted out. Paleoecology, biostratigraphy, and paleobiogeography are increasingly likely to be of interest to nonsystematists and should be treated exhaustively in the *Treatise*.

Volumes of the *Treatise* should contain selected cladograms and morphological matrices so that statements about phylogeny will be bolstered by phylogenetic analysis. For groups of invertebrate fossils not yet the subject of full-fledged phylogenetic analysis, a major function of the *Treatise* will continue to serve as a tool for investigation, phylogenetic and otherwise, rather than as a medium in which to publish current phylogenetic speculation, especially at the generic level. Doubts about the phylogenetic status of a taxon at any level should be noted. It is important to remember that despite the success of the phylogenetic methodology, influential schools of thought remain that espouse alternative methods, especially in the area of classification. *Treatise's* purpose will continue to be to provide sound information that all interested parties can manipulate and interpret as they see fit.

Geographic distribution should be expressed in terms of present-day geographic or political-geographic entities. Exceptions to this are ancient ocean areas, such as Tethys Ocean, or ancient continents such as Gondwana.

We use the Merriam-Webster's Geographical Dictionary, 3rd edition, as our guide to present-day geographic entities. Significant features of paleogeographic distribution, however, should be indicated with reference to paleogeographic reconstructions based on plate tectonics.

SECTION ON CLASSIFICATION

A discussion of classification is most informative if it includes a thorough history of the various classifications that have been proposed and the evolution of thinking that has led to the *Treatise* classification. Primarily, however, this section should present considerations pertaining to the classification adopted in the *Treatise* and a summary statement of the major subdivisions of the higher taxa.

SECTION ON SYSTEMATIC DESCRIPTIONS

The section devoted to systematic description is not necessarily more important than others, but it is indispensable and typically far exceeds other parts of the text in length. Arrangement of this section—including headings, text, and illustrations—is hierarchical and in orderly sequence from higher taxa to genera. The final arrangement of systematic descriptions, of course, does not indicate the order in which work to prepare them should be undertaken. Commonly, genera are characterized before diagnoses of families and higher-rank taxa are written. One *Treatise* author reported that he found it advantageous, when dealing with a whole group of genera, to take up routine tasks first—determining firmly the type species and their dates, accumulating data on stratigraphic and geographic distribution, and noting the best sources of illustrations—and then to write generic and family diagnoses. Last, he reviewed the whole group to see that duplication and inconsistency were avoided.

Authors preparing systematic descriptions may find it useful to use a separate page (both in paper copy and in electronic copy) for each taxon, whatever its rank, so that the inevitable insertions and rearrangements are easy to accomplish. Manuscript prepared in this manner also has space for notes that may help in organizing information but that are not to be included in the final text.

Stratigraphic range to the series or stage level should be submitted based on the most recent International Commission on Stratigraphy (ICC) chart (www.stratigraphy.org) and should present such information with an eye to indicating special features useful in stratigraphic paleontology. See page 9 for more specific instruction on stratigraphic listing. Authors will also find it helpful to consult the section on stratigraphic divisions in the editorial prefaces of volumes of the *Treatise* published after 1996.

Diagnoses of genera and higher taxa in the *Treatise* are written in telegraphic style. Authors who are unfamiliar with telegraphic style, especially those whose first language is not English, are encouraged to prepare manuscript in standard prose. Converting such prose into proper telegraphic style is much easier for the *Treatise* editorial staff than deciphering the meaning of unclear or improperly constructed telegraphic style.

Suprageneric Taxa

Systematic descriptions of suprageneric taxa begin with a centered heading that includes rank, taxon name, author, and date. This is followed by a more complete statement containing page reference and relevant nomenclatural information enclosed in square brackets. If there are synonyms, these

follow in another set of square brackets. Synonyms are arranged chronologically, and partial synonyms are denoted by the term *partim*. The following examples demonstrate the basic arrangement.

Order ACROTRETIDA Kuhn, 1949

[*nom. correct* GORJANSKY, 1960, p. 178, *pro* order Acrotretacea KUHN, 1949, p. 101;
emend. HOMER & POPOV, herein] [=Neotremata BEECHER, 1891, p. 354, *partim*]

Subfamily CRASPEDLTINAE Spath, 1924

[*nom. transl.* SPATH, 1931b, p. 547, *ex* Craspeditidae SPATH, 1924c, p. 17]
[=Garniericeratinae SPATH, 1952, p. 9]

The next paragraph, the diagnosis, includes all information essential for definition of the taxon as well as citations of pertinent literature. This paragraph concludes with a statement of stratigraphic range. No statement of geographic range is needed at this taxonomic level. A third paragraph may be included for supplemental discussion of a suprageneric taxon.

Genera and Subgenera

Generic or subgeneric descriptions typically include: (1) the name of the genus or subgenus with its accompanying author, date, and page reference; (2) the type species; (3) synonyms of the genus or subgenus; (4) a diagnosis; (5) a statement of stratigraphic and geographic occurrence; and (6) figure explanations. A statement of further pertinent information may be added in square brackets after the diagnosis. A thorough discussion of nomenclatural and other issues may be found in the editorial preface of the most recent *Treatise* volume. Following are two examples of generic entries.

Protabrograptus NI, 1981, p. 203 [**P. sinicus*; OD]. Minute tubarium with generally rounded base, consisting of two reclined stipes, comprised of two longitudinal filaments (ventral and dorsal) and apertural rings or crossbars; sicula fully preserved, merging into the ventral filament of second stipe. [This might not be a graptolite. A sicula cannot be recognized in the type material.] *Middle Ordovician (upper Darriwilian)*: China (Wuning).—FIG. 14,6a–b. *P. sinicus*; *a*, paratype, NIGP 57943; *b*, holotype, NIGP 57941; Wuning, Jiangxi, China, scale bars 1 mm (Ni, 1981, fig. 1).

Lamellophyllia CHEVALIER, 1962, p. 491 [**L. alloiteaui*; M]. Corallum solitary, ceratoid, free and slightly curved; epitheca *sensu lato* absent; wall synapcticulothecal, costate, granular; Pourtalès plan present in early ontogenetic stages, becoming increasingly lost in adult stages; five cycles of septa present in type species; septa compact; paliform lobes present; endotheca sparse, mainly restricted to peripheral parts of corallum; columella lamellar. *Miocene*: southern Europe.—FIG. 11,2a–b. **L. alloiteaui*, holotype, MNHN R10483, middle Miocene, Italy (Turin); *a*, calicular view of corallum (Cairns, 2001, pl. 2,d); *b*, lateral view of broken corallum (Cairns, 2001, pl. 2,c).

Each author is responsible for determining the correct spelling, authorship, publication date, and page reference of a genus or subgenus recognized as valid. Trustworthy determination of the type species is essential, and this responsibility should never be neglected or treated casually. The originally published name (with author, date, and page reference) is required in citing the type species, not merely the presently accepted name with author's name in parentheses. For example, the type species of *Deltacrinus* ULRICH, 1886, is cited as **Cheirocrinus clarus* HALL, 1862, p. 116, not as **D. clarus* (HALL), 1862, p. 116. However, in a figure explanation, a transferred species (presently accepted name) is cited with the author in parentheses but not the year: **D. clarus* (HALL).

Type species designation. How the type species was designated must also be explicitly recorded. The page reference and the letters OD (original designation) or M (monotypy) are inserted after the name of a type species fixed by some form of original designation, e.g., **Kalpinograptus* JIAO, 1977,

p. 290 [**K. spiroptenus*; OD]. SD is used for subsequent designation, followed by the name of the subsequent author, the date, and a page reference, e.g., *Nanograptus* HADDING, 1915, p. 328 [**N. lapworthi*; SD BULMAN, 1929, p. 179].

Synonyms. Objective synonyms should be identified by the abbreviation “obj.” See definition of objective in the International Code on Zoological Nomenclature, Fourth Edition [<https://www.iczn.org/the-code/the-international-code-of-zoological-nomenclature/the-code-online>]. All other synonyms are taken to be subjective, and the type species must be listed. Invalid original and subsequent spellings have varying status in nomenclature. It seems best to include them all with notation of their nature. *Nomina nuda* (*nom. nud.*) should also be included as a matter of information, even though they have no standing in nomenclature.

Diagnosis. Each genus is diagnosed concisely by giving prominence to important distinguishing characters, generally by placing them at the beginning of the diagnosis. The choice of characters and character states in the diagnosis should uniquely characterize a genus from other genera in the family. It is unnecessary to repeat in a generic diagnosis the features that characterize its family or subfamily. Authors are urged to avoid this practice, for it is time-consuming and difficult to correct editorially.

Taxonomic author notes. Authors are encouraged to include special taxonomic and nomenclatural notes on genera as well as additional documentation of the generic concept. Such information should be expressed in full sentences and placed at the end of the diagnosis and enclosed in square brackets.

Stratigraphic and geographic occurrence. The summary of stratigraphic and geographic ranges follows the diagnosis and any nomenclatural notes. The stratigraphic range, spelled out in full, comes first, followed by the geographic range, as in the following examples:

Silurian (?*Telychian*, *Wenlock*)–*Lower Devonian* (*Lochkovian*): worldwide.

Upper Cretaceous (*Turonian*–*Santonian*): Madagascar, USA, Japan.

If stratigraphic ranges differ by geographical areas, first give the total range, followed by a country/region breakdown.

Note: spell out countries, except USA (for the United States) and UK (for the United Kingdom).

The exact presentation of stratigraphical and geographical information may vary between volumes, depending on the complexity of the information, but presentation should be consistent within volumes. Note that, in general, we list countries alone without reference to the continents on which they are found. Stratigraphic ranges of genera should be given to the series or stage level in the latest version of the International Stratigraphic Chart (International Commission on Stratigraphy; www.stratigraphy.org). If the words upper, middle, or lower are used for a series or stage that is not divided as such in the ICC chart (e.g., Cambrian or Silurian), then the words must be lower case. It is better to use terms from the chart (Wenlock, Ludlow, for Silurian series). Note: Recent is not on the ICC chart. The term Recent (capitalized) should not be used. Sediments accumulating or processes operating at present should be referred to as modern or extant or by similar synonyms. In systematic text, cite Holocene and further define in parentheses if you wish [*Miocene*–*Holocene* (extant)]. Geographic ranges should be given to the smallest geographic or geopolitical unit that is likely to be recognized readily by readers, and may, in addition, refer to tectonic plates and subplates or biozones.

Figure explanations. The arrangement of figure explanations may vary slightly between *Treatise* volumes, but the basic elements remain the same. The same order should be used consistently throughout the volume.

- 1) **Author's control number**, which is retained until just before publication when the final, sequential numbers are inserted by the editorial office (see discussion of control numbers, p. 14). For *Treatise Online* chapters, numbers are sequential for each chapter (article).
- 2) **Name of the illustrated specimen** followed by authorship and year if not the type species identified preceding the genus description. In most instances, the illustrated specimen is the type species and authorship has already been provided. Give in its present, corrected form. For instance, a type species of *Serbarinia* listed as **Productus kalugensis* SARYTCHEVA 1928, p. 61 in the type species designation is given as **S. kalugensis* (SARYTCHEVA) in the figure explanation (repeat author in parentheses but not the year).
- 3) (Optional) **Kind of type specimen** referred to in the figure—holotype, paratype, syntype, lectotype, neotype, or topotype.
- 4) **Description of the illustrated specimen.** If more than one view is provided, these views are labeled with lowercase letters and explained (*a*, lateral view; *b*, dorsal view).
- 5) (Optional) **Geographic locality of the specimen.** In general, geographic localities and stratigraphic ranges are included only if the range or locality is more restricted than that given for the genus.
- 6) **Repository name and specimen numbers** need to be included. Abbreviations are used for museum repositories, with a guide to these abbreviations provided at the end of each *Treatise Online* article.
- 7) **Scale.** *Treatise* discourages use of magnification [$\times 3$], except in cases where most of the volume is already completed or a decision to do so has been made between coordinating authors and editors. Scale bars are more useful in the online universe. Scale bar size information may either be in the figure or listed in the explanation, but placement choice should be consistent throughout the whole volume.
- 8) **Source.** For previously published images, the author, date, and figure number is cited in parentheses—no need to include the word “from” (Maletz, 2010, fig. 23b). Use “adapted from” if changed in any substantial way (adapted from Maletz, 2010, fig. 5.4c]. If citation needs more detail, clearly explain (new, drawing based on data in Maletz, 2010, p. 42). Indicate “new,” if the first time published, followed by credit (new; photo by Peter A. Skelton)—if Skelton is the author. *Note, a new requirement. Give credit for the photo/image even if it's the author of the article. If image is from someone other than the author, do not designate “new” because it is difficult to check if the person has also shared it on a website, database, or other publication before *Treatise* releases, just credit photographer/artist followed by “with permission.” When specified, use wording as requested by the permission grantor (photo by A. De Angeli, Associazione Amici del Museo Zannato, Montecchio Maggiore, Vicenza, Italy). For previously published images, include the citation in the References section at the end of each *Treatise Online* article.

The elements described above are illustrated in the following systematic descriptions. More examples are given on pages 18–20 with figure samples.

RMF126. **E. frontalis* (H. MILNE EDWARDS), USNM 184251, Holocene, Indian Ocean, dorsal (*a*) and ventral (*b*) views, scale bars 1 cm (new; photo by R Feldmann).

Note: an asterisk is used to denote a type species. For the *Treatise Online* article, the editors changed the above to FIG. 2,4*a–b*.

JM128. **M. foliaceus* (MURCHISON); *a*, NHMUK PM 1288, proximal part of lectotype of *Diplograptus* (*Mesograptus*) *multidens* ELLES & WOOD; *b*, second specimen on NHMUK PM 1288, obverse view; scale bars 1 mm (new; drawings by John F. Riva).

REFERENCES

Note: Our guiding principle is to be as specific as possible without wasting space or being repetitious.

Placement of references. Complete bibliographic references for all cited works are included in a separate section at the end of each *Treatise Online* article. Reference lists should be alphabetically arranged and for multiple entries of the same author, by date. References should be submitted in a separate file or at the end of the article.

Elements included. A complete reference includes the following elements, separated by periods: (1) the surname of the author, followed by two initials or, if there is only one initial, the full given name if known; (2) year of publication; (3) complete title; (4) journal or publication name, written out in full; if a book, (5) publisher; (6) place of publication (generally only the city); and for all references (7) page, figure, and plate numbers, cited as first-to-last if part of a serial publication (e.g., p. 24–31, fig. 4, pl. 3–5). Give totals for books and any other publications that are independently numbered (e.g., 538 p., 86 fig., 142 pl.). You are not required to list figures or plates, but may if you wish. You may include a DOI number, if known [doi: 23TJ-0566-Gi9]. But it can never substitute for a conventional printed reference. A DOI or URL number is required for online-only publications, placed in bracket at end of reference. Example: Precambrian Research 349:105386 [doi:10.1016/j.precamres.2019.105386].

Use of abbreviations. Except for standard abbreviations of volume, page, figure, and plate (vol., p., fig., and pl.), no abbreviations are used in the bibliography. Note: fig, p., pl., abbreviations are used for both singular and plural (no figs., pp., or pls.). When using words that distinguish the publication (e.g., number 6, fascicule 2, livre 4, Band 2, Jahrgang 1923, Abteilung A, series C, Bulletin 1047, Memoir(e) 23, Paper 15, part 3), please spell out the word. *Treatise* editors prefer to give number and volumes for periodicals, in the following format: 102(4)145–149. Series are usually placed in parentheses before the number/volume/pages information. For instance (series 3) 102(4)145–149. You do not have to submit in this form. It is our responsibility to do it.

English vs. other languages. Titles in Cyrillic characters are transliterated, with an English translation provided in square brackets immediately following the transliterated title. Titles in other non-Roman alphabets such as Chinese are given in English with a note at the end of the reference indicating language of composition (see example below). Titles in German and the Romance languages should not be translated, and the capitalization rules of that language are followed. However, genus names should always be italicized.

Capitalization of titles. *Treatise* uses sentence case style for journal article titles and chapter titles—that is, the first word is capitalized and following words are lowercase unless they are proper nouns. Title case is used for titles of books—that is, all words are capitalized, except for the usual

articles (a, the, an), conjunctions (and, or), and prepositions (of, from).

Author names. Please use two initials for given names. If they do not have a second initial, spell out the first name. Sometimes neither option can be found, so there will be exceptions. Multiple authors are listed in the order as they appear in the cited publication.

Examples. The following examples illustrate different kinds of bibliography entries.

Journal articles

Logan, Alan, J. P. A. Noble, & G. R. Webb. 1975. An unusual attachment of a Recent brachiopod, Bay of Fundy, Canada. *Journal of Paleontology* 49:557–558.

Bonuso, Nicole, & D. J. Bottjer. 2008. A test of biogeographical, environmental, and ecological effect on Middle and Late Triassic brachiopod and bivalve abundance patterns. *Palaios* 23(1):43–54, 8 fig. [DOI: 10.2110/palo.2006 p06-006r].

Note: ampersands [&] are used between multiple author names. Journal titles that are in all capital letters or an unusual mix of upper and lower case are presented simply in upper and lower, e.g., *Palaios* and *Plos One*. There are a few exceptions in which a publication is known only by initials. Also note, no spaces within the number/volume/colon/pages listed.

Books

Erwin, D. H. 1993. *The Great Paleozoic Crisis: Life and Death in the Permian*. Columbia University Press. New York. 327 p.

Baron-Szabo, R. C. 2002. *Scleractinian Corals of the Cretaceous: A Compilation of Cretaceous Forms with Descriptions, Illustrations and Remarks on their Taxonomic Position*. Published by the author. Knoxville. 538 p., 86 fig., 142 pl.

Chapters within a book

Glaessner, M. F. 1969. Decapoda. *In* R. C. Moore, ed., *Treatise on Invertebrate Paleontology, Part R, Arthropoda 4, Vol. 2*. Geological Society of America & University of Kansas Press. Boulder & Lawrence. p. 400–533, 626–628.

Cooper, R. A., Jörg Maletz, Lindsay Taylor, & Jan Zalasiewicz. 2004. Graptolites: Patterns of diversity across paleolatitudes. *In* B. D. Webby, Florentin Paris, M. L. Droser, & I. C. Percival, eds., *The Great Ordovician Biodiversification Event*. Columbia University Press. New York. p. 281–293.

Note, page numbers of the specific article or chapter are given instead of total pages of book. Also note, the editor(s) name precedes the book title, followed by ed., or eds.

ICZN references

ICZN (International Commission on Zoological Nomenclature). 1963. Opinion 650. Graptolite generic names: Validation of certain emendations under the plenary powers. *Bulletin of Zoological Nomenclature* 20(2):105.

Russian

Dagys, A. S. 1968. Jurskiye i rannemelovye brakhiopody Severa Sibiri [Jurassic and Early Cretaceous brachiopods from northern Siberia]. *Akademia Nauk SSSR Sibirskoe Otdelenie Institut Geologii i Geofiziki (IGIG) Trudy [Institute of Geology and Geophysics, Academy of Science of the USSR, Siberian Branch, Transactions]* Vol. 41. 167 p., 81 fig., 26 pl. *In Russian*.

Note: “In Russian” simply follows at the end, as would other information that the author believes is relevant to include. See example below for adding useful information.

Winberg, G. G. 1956. Rate of metabolism and food requirements of fishes. Trudy Belorusskogo gosudarstvennogo universiteta Minske 54:253 p. Translated from Russian by Fisheries Research Board of Canada, Translation Series 194, 1960.

Thesis or dissertation

Zhang Yuandong. 1993. On the 'Arenig'–'Llanvirn' Graptolite Fauna from the Ningkuo Formation and its Evolutionary Model. Unpublished Ph.D. dissertation, Nanjing Institute of Geology and Palaeontology. 194 p.

Al-Rikabi, I. 1992. A Molecular Approach to Palaeontology: Biochemical Method Applications of Brachiopod Proteins. Master of Science thesis. University of Glasgow. 116 p.

A first name or second initial could not be found for the author above. Please include a DOI number for a thesis or dissertation. If not available, use the URL with an explanation, as in the example below.

Sewera, L. J. 2011. Determining the Composition of the Dwelling Tubes of Antarctic Pterobranchs. Honors thesis. Paper 48. Illinois Wesleyan University. Currently available at http://digitalcommons.iwu.edu/bio_honproj/48.

Chinese names

No scheme exists for one-to-one transliteration of Chinese characters into roman letters. Thus, a Chinese author may change the roman-letter spelling of his name from one publication to another. For example, the name Chang, the most common family name in the world, has been spelled more recently Zhang. The principal purpose of a bibliography is to provide the reader with entry into the literature. Quite arbitrarily, therefore, in the interest of information retrieval, the *Treatise* editorial staff has decided to retain the roman spelling that a Chinese author has used in each of his publications rather than attempting to adopt a common spelling of an author's name to be used in all citations of his work. This may also be true of other languages, such as a Czech author whose name was spelled differently in a German language article. It is entirely possible, therefore, that the publications of an author may be listed in more than one place under more than one name in the bibliography. Also, starting in 2023, *Treatise* uses the Western name order style for all authors, regardless of country of origin or language of publishing.

Mu, An-Tze. 1957. Some new or little known graptolites from the Ningkuo Shale (Lower Ordovician) of Changshan, western Chekiang. *Acta Palaeontologica Sinica* 5(3):369–437, 8 pl. (406-437, English text).

Mu, Enzhi (An-Tze), Jijin Li, Meiyu Ge, Yaokun Lin, & Yunan Ni. 2002. Fossil Graptolites of China. Nanjing University Press. Nanjing. xiv + 1205 p., 256 pl. In Chinese.

You may choose to use initials for Chinese given names (often listed after the family name—and usually two syllables, with no commas separating the two names). The above could have been Mu, E.-Z., J.-J. Li, M.-Y. Ge, Y.-K. Lin, & Y.-N. Ni (Mu An-Tze and Mu Enzhi are the same person.)

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For further guidelines for figure preparation, see Appendix 1, p. 22.

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Introductory figure explanations. Figure explanations for the systematic section text are discussed on page 17. Figure explanations for the introductory sections—for example, those that illustrate biology or morphology—should be submitted as a separate document or at the end of the text document. Each explanation is a single paragraph beginning with the author's control number, as explained on page 13, and a brief statement of the subject of the figure. A succinct description of salient features follows, which may include scale and repository numbers. Figure explanations do not contain discussion, nor should they restate material from the text. The source of each figure, whether previously published or new, is to be clearly indicated in parentheses at the end of each explanation (see examples on p. 16–17). A full bibliographical citation for previously published illustrations must be provided in the list of references.

Numbering introductory figures. Generally, we recommend using numbers for parts. In introductory text, separate parts with periods and no italics as used, and reserve letter for parts of parts [Fig. 1; Fig 3.2; Fig 4.2a–b].

Following are three examples of introductory figures, along with their explanations taken from *Treatise Online* articles.

Sample Introductory Figures

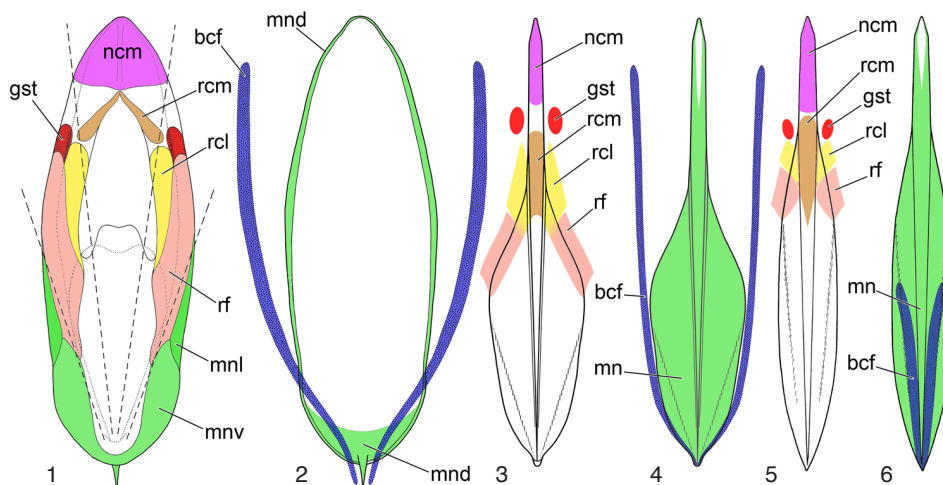


FIG. 13. Attachment of muscles to the shell; 1–2, *Sepia Linnaeus*, 1758 in 1758–1759, ventral (1) and dorsal (2) views; 3–4, *Chienopteryx appellof*, 1890, ventral (3) and dorsal (4) views; 5–6, *Loligo Lamarck*, 1798, ventral (5) and dorsal (6) views; zones of muscle attachment indicated by different colors; *bcf*, position of basal cartilages of the fins; *gst*, stellar ganglia; *mn*, mantle; *mnd*, dorsal mantle; *mnl*, lateral mantle; *mnv*, ventral mantle; *ncm*, nuchal cartilage; *rcl*, lateral component of the cephalopodium (head) retractors; *rcm*, medial component of the cephalopodium (head) retractors; *rf*, funnel retractors (adapted from Bizikov, 2008).

From Bizikov, V. A., & R. B. Toll. 2016. Part M, Chapter 9A: The gladius and its vestiges in extant Coleoidea. *Treatise Online* 77:1–31, 15 fig.

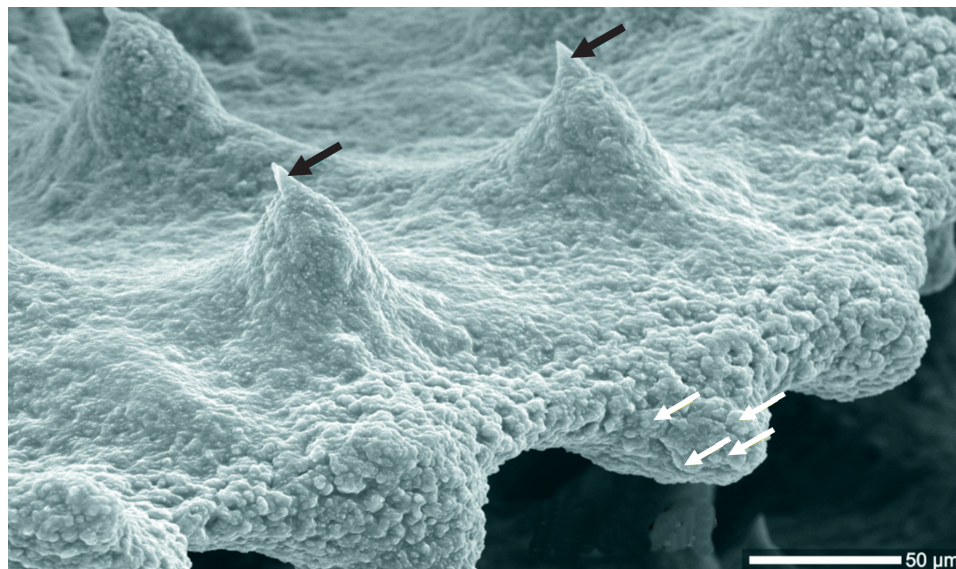


FIG. 1. Micromorphological features in *Heteropsammia*, showing clusters of nano-ganular-fibrous deposits on low septal teeth (black arrows) termed Rapid Accretion Deposits (RAD), and bundles of fibers on septal faces (white arrows) termed Thickening Deposits (TD), forming small patches (Arrigoni & others, 2014, fig. 3l; image, courtesy of Jarek Stolarski).

From: Baron-Szabo, R. C., & S. D. Cairns. 2019. Part F, Revised, Volume 2, Chapter 14: Systematic descriptions of the Scleractinia family Dendrophyllidae. *Treatise Online* 119:1–31, 17 fig., 2 tables.

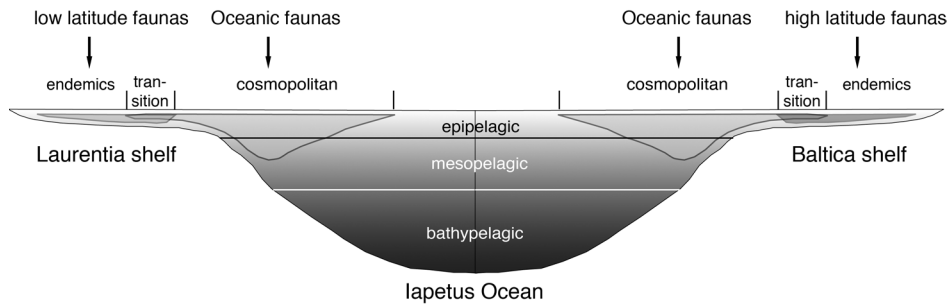


FIG. 2. Biogeographical and paleoecological distribution of the Graptolithina across the Lower Paleozoic Iapetus Ocean, showing endemic and cosmopolitan oceanic graptolite faunas as well as shallow to deeper water distributions (adapted from Maletz & others, 2011, fig. 9).

From Maletz, Jörg. 2020. Part V, Second Revision, Chapter 8: Paleogeography of the Hemichordata. *Treatise Online* 133:1–12, 4 fig.

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Each genus part should be labeled with a number and letter combination usually tucked in the lower left-hand corner of the figure (i.e., 1a, 1b, 1c for separate views of one genus). Scale bars should be no thicker than 3-point lines, and the same thickness should be used for separate scale bars on each figure. If overprinting a black number or label on a photo, or reversing it out (in white), please make sure it is highly legible when printed out—do not judge it by how it looks on your computer screen. We prefer that you leave this decision to our editors (see *Numbering* section below).

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Sample Systematic Figures

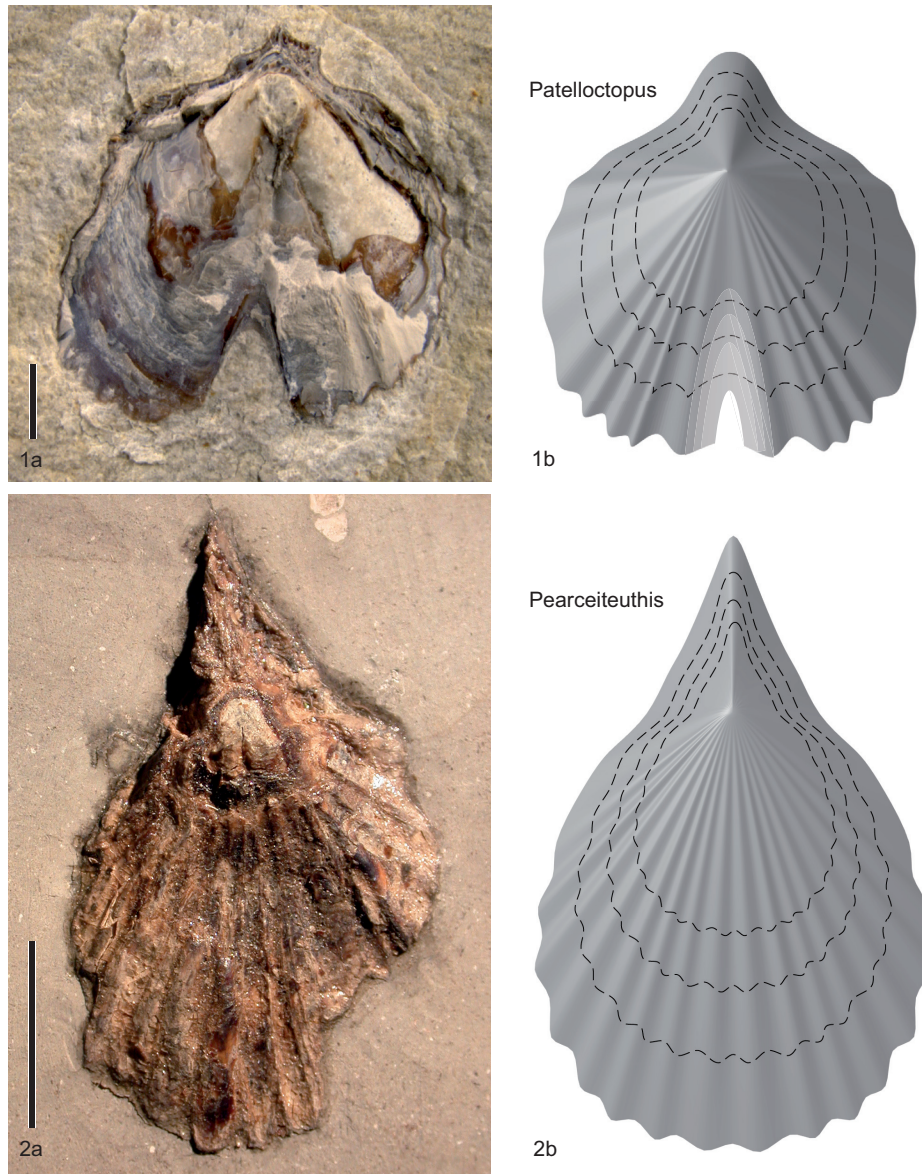


FIG. 28. Patelloctopodidae (p. 38–39).

Below is systematic text for the genus *Pearceiteuthis*, in which Fig. 28, 1a–b and Fig. 28, 2a–b are described:

—FIG. 28, 1a–b. **P. ilgi*, upper Kimmeridgian, Nusplingen Formation, Nusplingen, southern Germany; a, paratype, SMNS 70340, showing the gladius vestige in dorsal view; b, reconstruction of the vestigial gladius (new). Scale bar 10 mm.

—FIG. 28, 2a–b. **P. buyi*, upper Callovian, Oxford Clay, Christian Malford, UK; a, holotype, NHMUK PI OR34468, showing the gladius vestige in dorsal view; b, reconstruction of the vestigial gladius (new). Scale bar 10 mm.

From: Dirk Fuchs. 2020. Part M, Chapter 23G: Systematic Descriptions: Octobranchia. Treatise Online 138: 1–52, 36 fig.

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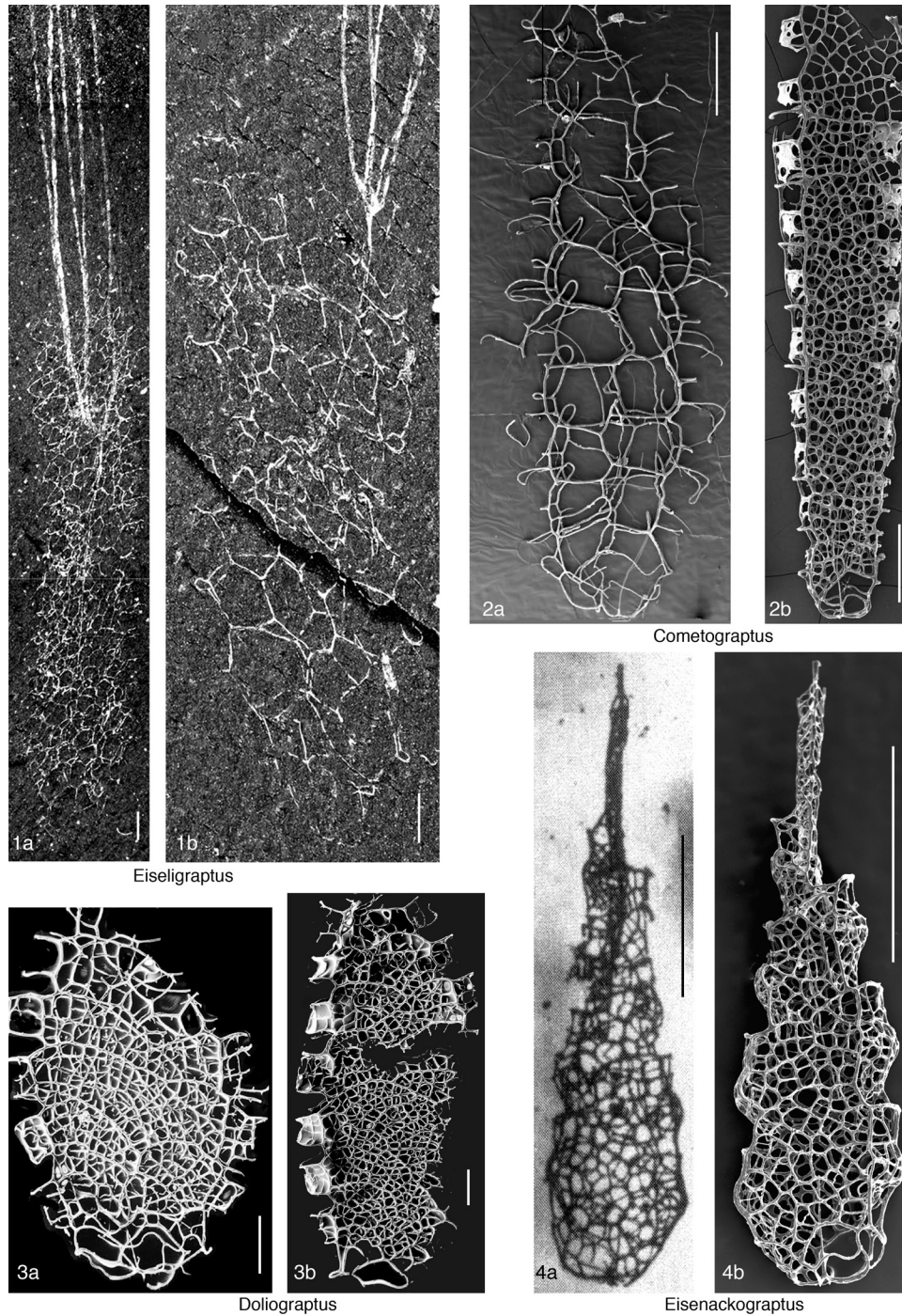


FIG. 16. Retiolitidae (Retiolitinae) (p. 17–18).

Below is a portion of the systematic text for *Eisenackograptus*, in which Fig. 17, 4a–b is described:

—FIG. 17, 4a–b. **E. eisenacki* (OBUT & SOBOLEVSKAYA); 4a, holotype, CINGR 33/8783, 1087a/24 *Testograptus testis* Biozone, central Taimyr, Russia, scale bars, 1 mm (Sobolevskaya, 2011, p. 259; specimen lost); 4b, GSC 104017, very well-preserved specimen, Wenlock, Lower Homerian, *Cyrtograptus lundgreni* Biozone, Arctic Canada, scale bar 1 mm (new).

From: Lenz, Alfred C., Denis E. B. Bates, Anna Kozłowska, & Jörg Maletz. 2018. Part V, Second Revision, Chapter 26: Family Retiolitidae: Introduction, morphology, and systematic descriptions. *Treatise Online* 114:1–37, 24 fig.

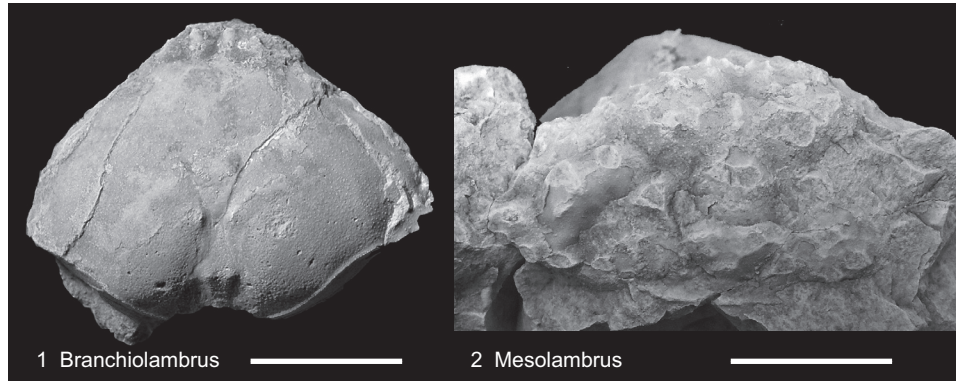


FIG. 5. Subfamily Uncertain (p. 8).

—FIG. 5,1. **B. altus*, holotype, USNM PAL 165478, Miocene, California, USA, scale bar 1 cm (new).
 —FIG. 5,2. **M. declinatus*, holotype, EGA-9.1 (M.91-151), Eocene, Hungary, scale bar 1 cm (photo by A. Busulini, Museo di Storia naturale, Venezia, Italy).

From: Schweitzer, C. E., R. M. Feldmann, & Hiroaki Karasawa. 2020. Part R, Revised, Volume 1, Chapter 8T9: Systematic descriptions: Superfamily Parthenopoidea. *Treatise Online* 131:1–11, 5 fig.

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Appendix 3: TREATISE TEXT STYLE TIPS

Treatise style quirks. Every publication has its own stylized conventions, and *Treatise* has more than its share. You are not responsible for submitting to the style specifications below. That is our copy editor's job. But if you are the kind of writer who enjoys the challenge, you may give it a whirl.

Small caps. *Treatise* uses small capitals for author names in text, including for authorship identification. [RIGBY and RICKARDS (1989) modeled graptoloids in relation to rotation and feeding efficiency during passive sinking.] The only exception in introductory chapters is when crediting a source in a figure caption [...diagram showing rotational movement of a multiramous colony (adapted from Rigby & Rickards, 1989, fig. 4).]

Ampersands [&]. *Treatise* uses “and” when mentioning authors in narrative text. [Example: MALETZ and others (2011) illustrated the heart-shaped nematularium of *Archiclimacograptus decoratus* (HARRIS & THOMAS, 1935) from western Newfoundland...] As this example shows, ampersands are used between author names in taxon authorship identification and in parenthetical sources cited within narrative text [...population dynamics (GÖTZ, 2007; HENNHÖFER, GÖTZ, & MITCHELL, 2012; HENNHÖFER & others, 2014).] Figure sources at the end of captions use “&” in both introductory and systematic text. Note: *Treatise* uses “& others” instead of et al.

Acronyms. Common acronyms are acceptable but must be spelled out on first mention with the acronym following in parentheses. [example: ... X-ray diffraction (XRD) and electron back-scatter diffraction (EBSD)...; Banded iron formations (BIFs) are widespread marine chemical sedimentary rocks typical of the Precambrian...] Thereafter, you may use the acronym alone.

Abbreviations (units of measure). Use without periods [5 cm, 5 myr].

Abbreviations (general). Use fig., pl., p., vol.—we do not add an “s” at the end to show plural, so not figs., or pls. Spell out the word “table.” A figure cited that is part of a plate is expressed as pl. 4,2 (not pl. 4, fig. 2). We abbreviate UK and USA (no periods) but spell out other countries. Do not use cf. to mean confer or compare; it can be confused with its meaning in open nomenclature, which is “identification is provisional.” Instead, spell out what you mean. Do not use c. for circa; ca. is better, spelling circa is even better. In systematic text, you may use the symbol [-] for approximately.

Numbers. Spell out one through nine. After that, digits may be used [...10 genera, 32 specimens]. Spell out any number that begins a sentence. Numbers applicable to the same category should be treated the same within a paragraph, even though a mix of single and multiple digits. Use digits in systematic text, except at beginning of sentences. Use digits with quantities and measurements (22 mm). You may use digits plus words [22 million years ago]. Spell out fractions [two-thirds] unless in a quantity consisting of both whole numbers and fractions.

Hyphenation. Two-word modifiers are hyphenated unless ending in “ly.” This sample shows both: [... the upward-growing flange connecting the initial part of th2¹ and forming the foramina for th2¹ and th2² and originating from the horizontally growing median part of th1¹...]

Hyphenated vs. compound word. More and more frequently, formerly hyphenated words are becoming one word. Webster's 11th is our guide for these transitional compound words. So ridge-like, but rodlike. Spindle-like but tubelike. Don't ask why.

Prefixes. Most are not hyphenated [nonbranching; postmortem]. See Chicago Manual of Style 7.85 for guides and charts).

Different style for introductory text and systematic text figure numbers. In introductory text, separate parts with periods [Fig. 3.2; Fig. 4.2a–b] and nothing in italics. In systematic text, *Treatise* has traditionally separated parts with commas and italics [Fig. 3,2; Fig. 2,2a–b]. This style is under review and may change—with all figures following the same style. Please check with the editor. Use an en dash to show consecutive parts and repeat figure number [introductory text: Fig. 2.1–2.3; Fig. 5, Fig. 7.] For non-consecutive part numbers, style is Fig. 43.2, 43.4, 43.6. When citing figures from other sources, whether in introductory or systematic text, authors may use the numbering style of the original publication.

Open nomenclature. Please consult the discussion and recommendations of Peter Bengtson, which *Treatise* follows. (Peter Bengtson. 1988. Open nomenclature. *Palaeontology* 31:223–227).

Handy reminders. We all need a refresher on common errors from time to time.

1. **The difference between i.e. and e.g.**—i.e. stands for *id est* or “that is.” Used to introduce a rephrasing or elaboration on something that has already been stated; e.g. stands for *exempli gratia*, meaning “for example.” This term is used to introduce examples of something that has already been stated. Don’t overuse e.g., such as to introduce a long list of sources. We expect authors to pick the best citations to recommend, not list everyone who has written on a topic.
2. **The difference between “that” and “which.”** “That” for a defining clause (essential to meaning); “which” for a nondefining clause (adds to the information but doesn’t limit the meaning). Note: a comma precedes “which,” but no comma before “that.”
3. **Like.** Don’t use “like” to mean “such as” or “similar to.”
4. **As.** Don’t use “as” to mean “because.”
5. **Composed/comprised.** Don’t use “composed of” to mean “to be made up of.” Comprised is the correct word.
6. **About, around.** Don’t use when you mean “approximately,” which is much more precise. Use of the symbol [-] is acceptable in systematic text, especially with numbers.
7. **Often.** It lacks precision for scientific writing. Better words: typically, commonly. If you intend to be vague, “generally,” may be used. The same goes for “sometimes,” and other time-related modifiers.
8. **Use active verbs when possible.** Be-verbs (is, are, was, were, etc.) can be boring and lazy. Try not to start a sentence with, “There are...” or “It is...” For instance, instead of “There are five genera in the family...” write “Five genera comprise the family...”
9. **Refresh your memory** by reading Section 5 on “Grammar and Word Usage” in the Chicago Manual of Style, 16th edition.
10. **British vs. American spelling.** We follow American spelling, so disk, not disc; toward, not towards; organization, not organisation.

If you have questions or need more detailed information, please email editor@ku.edu.