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2- Introduction

The Embryo Project, and its primary product, the Embryo Project Encyclopedia, have many structures and functions. This handbook is a first step to help you learn about those two things and about their many structures and functions. More importantly, it provides a manual to help you contribute products to Embryo Project Encyclopedia. Before we introduce this handbook and the products it will help you create, let’s first introduce the Embryo Project and the Embryo Project Encyclopedia.

The Embryo Project (EP) is comprised of a group of researchers who pursue a set of goals related to university education, research into the history and philosophy of science, and public outreach. The EP started in 2007 with a US National Science Foundation grant to Jane Maienschein and Manfred Laubichler in the School of Life Sciences at Arizona State University. Since then, more than one hundred researchers have contributed to the EP in different capacities, from undergraduate and graduate students, to postdoctoral researchers, professors, computer programmers, and librarians, just to name a few. Those people have come from disciplines such as biology, history, law, English, philosophy, art, and computer science, also just to name a few. Insofar as you use this handbook to create products for the EP, you join that legacy of people who make the EP successful. Let’s now detail some of the goals of the EP.

For those reading this handbook, two of the three families of goals are the most important: university education and public outreach. For university education, EP researchers fashion classes in which students improve their ability in skills traditionally taught by different parts of the university. For instance, in the Embryo Project Writing Seminar, students learn how to write and workshop papers, research original records, and present information historically, all skills traditionally taught by humanities programs. Simultaneously, those students learn to understand and critique scientific results and evidence, to connect science to broader issues, and to locate and summarize complex scientific publications, all skills traditionally taught in science programs. EP classes also introduce students to digital classrooms and collaboration, and they structure assignments such that final products have value beyond those of traditional classes. Students who make good final products see their work published in the Embryo Project Encyclopedia, the main outlet by which EP researchers achieve their public outreach goals.

For public outreach goals, EP researchers recognize several facts. First, non-scientists increasingly must learn about embryos, development, and reproductive medicine. People must vote on public policy relating to embryos, choose reproductive methods, or understand how genetics impacts their lives. Second, few resources exist where people can learn about those issues from sources that are neither too full of jargon nor too light on science. Third, studies show that, even as the amount of data created by scientists skyrockets, non-scientists remain ignorant of that data, how to interpret it, and how to evaluate it. EP researchers work to create products that, without “dumbing-down” science, will help non-scientists learn how to think
scientifically. The primary outlet by which EP researchers strive to meet that goal is the Embryo Project Encyclopedia.

The Embryo Project Encyclopedia is an online encyclopedia about embryology, developmental biology, and reproductive medicine. The encyclopedia primarily targets an inclusive audience of people who are not specialists in those disciplines, but who have between nine and sixteen years of education. The encyclopedia publishes short descriptive articles about topics from the three aforementioned disciplines, as well scholarly essays, photos, videos, scientific illustrations, and other types of objects. EP researchers publish the Encyclopedia according to Open Access (OA) best practices and Creative Commons (CC) licensing, which entail that the Encyclopedia’s contents are free to anyone with an internet connections, and that they may be shared and distributed as long as they are done so not for profit. EP researchers strive for the content of the Encyclopedia to surpass in quality that of many other OA and CC products, so they publish new content only after they have subjected it to rigorous peer and editorial review.

The goal of the EP Encyclopedia is to improve, among non-specialist and inclusive audiences, widespread scientific literacy about embryology, development, and reproductive medicine. To accomplish that goal, and in light of the facts listed two paragraphs earlier about how everyday people interact with science, EP researchers rely on historiographic methods to construct the articles that they publish in the EP Encyclopedia. EP researchers hypothesize that history is a good method by which to introduce, contextualize, and explain science to many people. The EP Encyclopedia is the primary product of that hypothesis, and it’s effectiveness to increase public scientific literacy provides the test of the hypothesis.

You needn’t care about embryology to help test that hypothesis or to contribute to the Embryo Project Encyclopedia. People who’ve participated in the EP have many interests. Some care about embryology, some about learning how to write, research, or construct histories. Some care about unraveling the histories and senses of concepts. Some care about developmental biology, some about reproductive law. The point is that you needn’t care about embryos or embryology to succeed in the Embryo Project or for its Encyclopedia.

You must, however, care about increasing widespread scientific literacy among inclusive audiences. For the Encyclopedia, the primary audience is paramount, and everything published in it is constructed with the primary audience in mind; people who have at least between nine and sixteen years of education, but who aren’t professionals in embryology, developmental biology, or reproductive medicine. That audience is porous, however, and the Encyclopedia has many secondary audiences. Don’t strive to exclude members of different audience, work to include the primary audience.

This handbook will help you write short descriptive articles about topics from embryology, development, and reproductive medicine, articles aimed for inclusive audiences via the Embryo Project Encyclopedia. This handbook collects years of insights from dozens of researchers about how to identify topics, research those topics, write well, write histories, and write good encyclopedia articles. If you want to maximize the chances that the articles you write
pass peer and editorial review and get published, read every word of this manual. This is the third edition of the handbook, the first was written in 2007 and the second in 2011. We hope that future contributors, editors, instructors, and researchers will make this handbook, as well as the Encyclopedia in general, more perspicuous, complete, and concise.
3- Article Categories

There are fourteen categories of EP Encyclopedia articles. Every EP Encyclopedia article written and published falls into one of the fourteen categories. A list of them is below, along with their abbreviations. It’s easier to write about topics that fall within the categories at the top of the list than it is to write about topics that fall within the categories at the bottom of the list.

- People- Pe
- Experiment- Exp
- Technology- Tech
- Literature- Lit
- Law- Law
- Organization- Orgz
- Concept- Con
- Image- Img
- Context- Cxt
- Ethics- Eth
- Award- Awd
- Place- Pl
- Religion- Rel
- Organism- Org
4- The Process of Writing Articles

Below is a description of a general writing process for EP Encyclopedia articles. Before you write an article, you must have at least several bits of information. First, you must have the name of your topic. Second, you must be able to locate your topic in time and space. Third, you must have the article category your topic best fits. Finally, you must also be able to state clearly why your topic is significant to the history of embryology, development, or reproductive medicine. Once you have those bits of information, you can research your topic and write your article’s first draft. The steps described below are general, and different people will take them in slightly different orders.

a) Do preliminary research to determine which topics interest you.

b) Pick a topic, and pick a category into which it fits. Beginners should start with a People article to familiarize themselves with the style of the EP Encyclopedia before moving on to more difficult categories.

c) Search the EP Encyclopedia website to see if it already has an entry on your topic. If not check the list of taken topics and work with an editor to see if anyone has claimed your topic.

d) If your topic is free, refine it so that it is specific to a period of time, a place in space, and some people. For instance, if your topic is the concept of body plans, two possible refinements are: Body Plan Concepts in Germany (1800-1830), or Karl Ernst von Baer’s Concept of Body Plan.

e) Learn why your topic is significant to the history of embryology, development, or reproductive medicine. Be able to write that significance in one sentence.

f) Read the specialized writing guide for your category, and be able to answer most of the questions in that guide.

g) Research your topic further. Find and read journal articles, developmental biology textbooks, and scholarly books, not just websites, to learn about your topic. Those articles and books will comprise your works cited, and many of them will comprise your primary source material.

h) Outline your article. Use the specialized writing strategies to help you. Use your statement of significance to help you decide what to include and what to exclude from your article.

i) Write your article’s first draft. Your statement of significance should be in your first paragraph.
j) Workshop your article.

k) Revise, revise, revise.

l) Polish your article. Make sure it follows the format of the sample article at the end of this handbook. The sample articles are only for format, not content or length.

m) Submit your article for editing.

n) If you get your article back with suggestions for improvements, incorporate them and resubmit your article as soon as possible.

o) If you are in a writing seminar, once your instructor has approved your work for the class, she will send it to the editing team, who will decide to publish it, request extensive revisions from the author with the guidance of an editor, or decline it.
5- General Remarks about Style

Introduction

This and the next few sections provide a framework, both grammatical and stylistic, to help you learn to write well or better than you currently do. That framework also helps you learn to write encyclopedia articles that tell histories. This section, as its title indicates, provides a broad foundation for that framework. The next section provides more specific strategies that you should employ to write well. The section after that provides a list of style issues specific to the EP Encyclopedia, and you should keep that section handy as you write your articles.

The framework stems from one principle that is core to the EP Encyclopedia: EP Encyclopedia writers don’t ‘dumb-down’ or obfuscate science. Rather, they write their articles according to several principles of style. Researchers developed those principles after studying how people comprehend and retain information presented in English prose. When writers follow those principles, people who read their prose retain and understand the content of that prose better than if the writers had followed different principles.

The framework described below distills key points from several sources. If you would like to read those sources, or if you want to learn more about how to write well, you can find the most important sources in the bibliography of this Handbook. The most important sources, in descending order of importance, are:

*Style: Lessons in Clarity and Grace*, by Williams and Coulomb
“The Science of Scientific Writing,” by Gopen and Swan
*The Elements of Style*, by Strunk and White
*On Writing Well*, by William Zinser

Why Read or Follow These Remarks on Style?

Writers new to the EP are often skeptical that these sections on style are important for them. They commonly hold at least one of two positions. Let’s describe those positions and then explain where they go wrong.

First, many writers new to the EP believe that they already write well, and that they’ve little to learn about English prose style. In fact, many writers new to the EP do write well, and the EP wouldn’t have accepted them if they didn’t. Writers new to the EP often participate in the EP Writing Seminar, and that seminar aims to transform people who write well into people who write well about complex topics, such as science and its history. To do that, new EP writers often need to refresh their knowledge about style and grammar, and they need to learn new ways to manipulate style and grammar to learn how to write about science for inclusive audiences. So while many new EP writers write well, they also have much to learn about English prose style.

Second, many new EP writers feel that the framework for style and grammar presented in this and the next section is arbitrary, and they feel that they’ve no obligation to follow it.
For example, imagine a new EP writer writes the sentence:

(1) The gastrulas that had been irradiated by Williams on Sunday morning and by Johnson on Sunday night had decreased involution and increased green colors.

EP researchers would encourage the new writer to translate the sentence into something like:

(2) Williams irradiated the gastrulas Sunday morning, and Johnson irradiated them Sunday night. Afterwards, compared to normal gastrulas, the irradiated gastrulas were greener and less involuted.

New EP writer sometimes object that the first sentence has the same content as the second sentence, which is correct. New EP writers will often then conclude that, as the two sentences have the same content, we shouldn’t prefer the second sentence to the first. That conclusion relies on the assumption that only a sentence’s content, and none of its other properties, make the sentence good or bad. That assumption is false, so the conclusion doesn’t follow.

Sentences are never just good or bad, they are good or bad for the audience that reads them. The EP Encyclopedia aims its articles primarily for an audience of non-specialists, people who have between nine and sixteen years of education. If people in that audience can retain and understand the content of sentences from the EP Encyclopedia, then those sentences are good for that audience. Research indicates that people who read English sentences like (2) understand and retain the content of that sentence better than if they read sentences like (1).

Furthermore, sentences are good for the writer if those sentences help the writer accomplish her goals. One of the primary goals of the Embryo Project Encyclopedia is to increase scientific literacy among its primary audience. Insofar as people understand and retain the content of sentences like (2) better than sentences like (1), if you write sentences like (2), then you will help the EP Encyclopedia achieve its primary goal.

Researchers have shown that the principles of style below apply to audiences beyond just those with between nine and sixteen years of education. If you can apply those principles to write about the history of science for inclusive audiences, then you can apply them to write English prose about any topic for any audience of English readers.

**Basic Sentence Grammar**

In many languages, the primary components of a descriptive sentence are the subject, the verb, and the object.

- **Subject:** The thing performing an action.
- **Verb:** The action.
- **Object:** The thing acted upon by the subject.
For example:

(3) Mangold sutured the tissues.

In (3), ‘Mangold’ is the subject, ‘sutured’ is the verb, and ‘the tissues’ is the object. Every sentence has a subject and a verb, but not every sentence has an object. For Example:

(4) The sea urchin gastrulas developed.

For sentences more complex than (3) and (4), it’s more difficult to identify the subject, verb, and object. For instance, in (1), the subject is ‘the gastrulas that had been irradiated by Williams on Sunday morning and by Johnson on Sunday night’, the verb is ‘had’, and the object is ‘decreased involution and increased green colors’. Many people think that the sentence’s verb is ‘had been irradiated’, others think that the verb is ‘decreased’ or ‘increased’. The words just quoted are conjugated verbs, but none of them function as the verb of the sentence. Instead, they function as parts of complex noun phrases, phrases that fill subject and object places of the sentence.

Good writers know, for any sentence they write, which words function as the subject, which as the verb, and which as the object. Furthermore, they can identify the subjects, verbs, and objects of other people’s sentences. You should practice identifying subjects, verbs, and objects in your sentences and in those of other writers.

**Active sentences and passive sentences**

English prose sentences fall into roughly two categories, active and passive. You can translate most any sentence from one category into a sentence of the other category. Sentences of either category are grammatically correct, but they are not equally good for the Encyclopedia’s writers or audience. Before we talk about the costs and benefits of each kind of sentence, let’s look at the differences between sentences of the two categories.

Active sentences, like (3), place the thing performing an action before the verb and the verb before the thing acted upon. Passive sentences change the order of the things represented in the sentence. For passive sentences:

- **Subject:** The thing acted upon by the object.
- **Verb:** The action.
- **Object:** The thing performing an action.

For instance, we can translate (3) into:

(5) The tissues were sutured by Mangold.
Furthermore, you can drop the object of a passive sentence, the thing performing the action, from any passive sentence. For example:

(6) The tissues were sutured.

Note that (5) and (6) require the verb phrase ‘were sutured’, whereas (3) requires just the verb ‘sutured’.

There are several good but imperfect methods to identify passive sentences. You can identify passive sentences by looking for verb phrases that begin with conjugated ‘to be’ and ‘to have’ verbs. You can also identify passive sentences by looking for verb phrases before words that describe the thing acting. Also, if you cannot identify in a sentence the thing acting, as in (6), then you have found a passive sentence.

Let’s discuss the costs and benefits of the two kinds of sentences. In much of academia and especially in science, people write passive sentences. They do so for rhetorical reasons. They claim that if you write passive sentences, then you can grammatically drop the thing performing the action from the sentence, and your sentence therefore sounds more general. They hold that, especially when reporting procedures, you should write sentences like (6) and not sentences like (3). When people read sentences like (6), they won’t think that the success of the procedure depended on something subjective to the person performing the procedure.

For the Embryo Project encyclopedia, we encourage you to write active sentences. We have our own rhetorical reasons. Generally, people who read English prose understand the contents of active sentences better than they do that of passive sentences. Passive sentences, especially many in a row, bore readers. Good writers, and good EP Encyclopedia writers, aim for active sentences.

**Principle: Write active sentences.**

A final note about passive sentences. Some people believe that any sentence is passive if it has a ‘to be’ or a ‘to have’ verb in it. That belief is false, and you shouldn’t use it to avoid those verbs. All passive sentences have a ‘to be’ or a ‘to have’ verb as part of a verb phrase, but not all sentences that use one of those verbs are passive. For instance:

(7) The lab had one primary investigator, to technicians, and thirty cows.

The sentence (7) is not passive. However, if you string together many active sentences in which you use ‘to be’ and ‘to have’ verbs, then you will have the same effect upon your readers as if you had written passively. You will bore them to sleep.
When writers transform a word that is normally a verb into a noun, we call that noun a nominalization. Writers use nominalizations to refer to actions not with verbs, but with nouns, and then they use those nouns as the subjects or objects of sentences. You can identify two common types of nominalizations by looking at the last few letters of the word. If the word ends in ‘ion’, or in ‘ing’, then there’s a good but imperfect chance that it’s a nominalization. For example:

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<td>imprint</td>
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When people read English prose, they struggle with nominalizations for at least three reasons. First, English readers expect to find the verb of a sentence, not the subject or the object, representing the important action. Compare

(8) Irradiation of the flies by Muller was able to lead to mutations in them.

(9) Muller irradiated the flies, and then they mutated.

In (8), we nominalize the important actions in ‘irradiation’ and ‘mutations’. The nominalizations force us to use a complex noun phrase for the subject of the sentence, ‘Irradiation of the flies by Muller’, and they force us to use the boring verb ‘was’. In (9), we refer to the interesting actions with the verbs ‘irradiated’ and ‘mutated,’ and we lose the complex noun phrase and the boring verb. In (8), we don’t represent the important actions in the verbs of the sentence, where English readers expect to find them, and we instead hide them in the sentence’s subject and in its object. When you nominalize verbs, you frustrate the norms of clarity, style, and active writing that English readers expect you to follow.

Second, when you nominalize verbs into nouns, you construct concepts that seem more abstract than the original concept; and the more complex the concept, the more English readers struggle to understand it. Is the concept associated with ‘irradiation’ really more complex than that associated with ‘irradiate’? For our purposes, the answer doesn’t matter. English readers indicate in surveys and in tests that the nominalized concepts seem more complex and harder to
understand than the verbs from which writers construct them. For the EP Encyclopedia, we care about the seeming complexity, and we try to avoid it.

Finally, English readers struggle with nominalizations because those words are often ambiguous, or have multiple meanings, or associate with multiple concepts. When people read English prose that includes nominalizations, they struggle to discern the appropriate concept with the nominalization. Many nominalized words refer to a process and to the result of that process. For example, ‘mutation’ can mean the process by which something mutates, or it can mean the result of that process. We find such ambiguity especially among nominalized words that end in ‘ing’. For instance, ‘patterning’:

(10) Once an embryo exhibits axis patterning, then it can begin limb patterning.

In (10), ‘axis patterning’ probably refers to the result of a process, while ‘limb patterning’ probably refers to a process itself. But non-specialists will struggle to discern the appropriate meaning of each word. And the more you read things written by scientists, the more you’ll suspect that they too struggle with the task.

**Principle: Avoid nominalizations, especially for the subjects of your sentences.**

Twin origins of bad style

Much bad style stems from nominalized verbs and from passive sentences. Furthermore, as indicated by several of the above example sentences, many passive sentences have nominalizations for the subjects of those sentences, and many sentences with nominalizations exhibit passive grammar.

When we revise sentences so as to remove nominalizations from them, we often must also change the grammar of the sentences so as to make them active. Similarly, when we revise sentences to make them active, we often—but not always, must excavate the active verbs from the nominalizations in the sentence.

Clichés and colloquial words and phrases

The long and the short of it is that when writers use those old saws that make the world go ‘round, clichés, they tend to fumble at the goal line or look like loons on a ledge; their readers never get a good sense of the action, and they mosey on down the line as if their lives depended on it, and they avoid that writer like the plague.

On the other hand, their good buddies who scribble colloquial words or phrases as if for the tube or the big screen, they too screw up their scratch, especially for the olds, who get tongue-tied and straight-jacketed at the thought of picking out the wheat from the chaff.

**Principle: Don’t use clichés or colloquialisms.**
Many people struggle to understand clichés and colloquialisms, especially those for whom English is not their first language.

**Principles of style, not strict grammatical rules**

In this chapter and in the one that follows, we examine several principles of style. Principles of style differ from grammatical rules in that writers follow principles of style to make sentences better or worse, whereas they follow grammatical rules to ensure that the words they string together form sentences rather than nonsense. When we write passive sentences or sentences with nominalizations in them, we follow English grammatical rules and construct legitimate sentences. The problem with those sentences isn’t grammatical, it’s stylistic. They’re hard for most English readers to understand.

Most writers struggle, in every sentence that they write, to satisfy all of the principles. Sometimes for a given subject matter, the principles conflict. In order to write an active sentence, sometimes you must use a nominalization as the subject. Sometimes to avoid a nominalization, you must write a passive sentence.

Good writers, however, understand the principles, how to deploy them, and when they conflict. Even better writers occasionally flout those principles to make their sentences better than they normally would have been. Any principle is sometimes dashed for the sake of clarity. Truly knowing it is knowing how to flout it.

For your EP Encyclopedia articles, learn and follow the principles as best as you can. As you grow as a writer beyond the EP, learn how to occasionally flout them.
6- How to Write Well

This chapter discusses four main topics: how to write good sentences, how to write good paragraphs, how to write good papers, and how to write good EP Encyclopedia articles. The content in this chapter builds on the principles discussed in the previous chapter. The chapter ends with a list of the primary principles that you should follow as you write articles for the EP Encyclopedia.

How to Write Good Sentences

First, English readers look for things that can perform actions to be the subjects of sentences. People, organizations, animals, and other corporeal things make good subjects, nominalizations don’t. Compare

(11) Fixation of the flies on a pinboard by Morgan was what enabled him to examine them.

to

(12) Morgan affixed the flies to a pinboard, which enabled him to examine them.

In those two sentences, ‘Morgan’ is a better subject than ‘Fixation of the flies to a pinboard by Morgan’.

Second, English readers look for verbs to represent the important action of the sentence. In (11), the important verb is encased in the nominalization ‘Fixation’.

Third, English readers struggle to understand a sentence when the sentence’s verb is far from the beginning of the sentence. In (11), the sentence’s verb is ‘was’, which is ten words into the sentence. In (12), the verb ‘affixed’ is the second word of the sentence.

Furthermore, English readers struggle to understand a sentence, even if the sentence is active, if the verb is far from the subject. Compare (12) to

(13) Morgan with his fruit flies of the species *Drosophila Melanogaster* (*D. Melanogaster*)--well on their way to model organism status in early to mid-twentieth century genetics labs, especially at Columbia University, but in other places as well--for the summer traveled to Woods Hole.

The sentence (12) has zero words between the subject ‘Morgan’ and the verb ‘affixed’, but (13) has thirty nine words between the subject ‘Morgan’ and the verb ‘traveled. English readers understand sentences like (12) much better than they do sentences like (13).

**Principle: Use words that refer to corporeal things for subjects, words that refer to
interesting actions for verbs, keep those words close together, and put them at the beginning of your sentences.

Finally, readers perceive a topic position and a stress position in every English sentence. If we speak loosely, the topic position is roughly the first half of an English sentence, and the stress position is roughly the second half. We discuss topic and stress positions more in the following section, but we introduce them now. Good writers use topic and stress positions to their advantage.

Writers use topic and stress positions to help sentences flow together and to help readers identify new content. Most every English prose sentence introduces new content to its readers, but it’s also part of a larger text. Good writers use the topic position to connect a sentence to its predecessors in the text. They use the stress position to introduce new content. The topic position includes the subject of the sentence and often transitional phrases and subject-qualifiers and sometimes the verb of the sentence. Good writers use the subjects or objects of previous sentences in the topic position. The stress position includes the object of the sentence and often extra clauses and qualifications. It can also include the verb of the sentence. In the stress position, good writers introduce new information to the reader.

(14) Morgan affixed the flies to the pinboard, which enabled him to examine them. He recorded his observations into a green lab notebook. With the pinboard and the notebook he then traveled to Woods Hole for the summer.

In (14), the three sentences use topic and stress positions to their advantage. ‘Morgan’ is the subject of the first sentence, and ‘Morgan’ remains the subject in the second and third sentences. The topic position of the second sentence connects to the content of the first sentence by using the same subject, while the topic position of the third sentence connects to the previous sentences by using the same subject and by using some of the information introduced in each of them: the pinboard and the notebook. The stress position of the second sentence introduces the new content of the green lab notebook, while the stress position of the third sentence introduces the new content of the trip to Woods Hole for the summer.

**Principle:** Use the topic position of a sentence to tie it to the content of previous sentences, and use the stress position of a sentence to introduce new content.

Now that we’ve discussed how to construct good sentences, let’s discuss how to use them to build good paragraphs.
**How to Write Good Paragraphs**

Good paragraphs exhibit several features. First, they have a topic sentence. A topic sentence is like a thesis statement for your paragraph. It unites the content of the paragraph into a whole unit, it helps you excise from the paragraph sentences that have content disconnected from the content of the other sentences in the paragraph, and it makes explicit for your readers the purpose of the paragraph. Furthermore, if the topic sentence is like a thesis, then the other sentences in the paragraph provide the evidence to show that the topic sentence is true. Often people write topic sentences for paragraphs as they revise their papers.

Second, in good paragraphs, writers string their sentences together according to the above principle about topic and stress positions. To do so, writers use just a few different sentence subjects per paragraph. Many good paragraphs have a primary subject, just as good sentences do. To identify the subject of a paragraph, look for the subject of the topic sentences, and look for the subject in the majority of the paragraph’s sentences.

Third, good paragraphs lack pronouns in their first sentences. Insofar as writers mention something, such as a person, in the first sentence of a new paragraph, they provide the name of that thing and don’t use a pronoun. In general, anytime you refer to someone for the first time in a new paragraph, you should use that person’s name and not a pronoun. If you mention the person for the first time in the paper, use the person’s full name. If you’ve already mentioned that person earlier in the paper, then just use the person’s last name.

Fourth, good writers often use the last sentence of a paragraph to transition to the next paragraph. Writers often struggle with transitions. Many think that transitions are hard to write, but generally the problem is that not all paragraphs require transitions to and from them. To write a good transition between paragraphs, in the stress position of last sentence of the first paragraph, introduce information that will be in the topic position of the first sentence of the second paragraph. To identify when you need a transition, this handbook won’t help much, as its writers can’t distill a principle to guide the use of transitions. The best we can say is that writers often use transitions well when they link paragraphs that present information chronologically.

Now that we’ve discussed how to construct good paragraphs, let’s discuss how to use them to build good papers.

**How to Write Good Papers**

Good papers exhibit several features. Foremost among them is organization. Furthermore, good papers have clear theses. A thesis is a statement that describes the conclusion reached by the writer in the paper. A paper’s organization is its pattern by which it provides information. Let’s review theses and then organizations.

Good theses have several characteristics. First, they are clear and succinct, often composed in a single sentence. Writers who compose succinct and clear theses for their papers reap several rewards. Such theses provide writers a kernel around which to organize the rest of their papers, they enable writers to excise unnecessary information from their papers, and they make explicit to the reader the purpose of the paper. Second, good theses appear early in the
paper, often in the first paragraph, a placement that helps readers decide if they will continue to read the paper. Finally, good writers explicitly label their theses, a practice which enables their readers to identify the most important message of the paper.

Good theses help writers organize their papers in several ways. First, a good thesis provides a target for all of the topic sentences from most of the paragraphs in a paper. The topic sentences should jointly show that the thesis is true: they should justify the thesis or substantiate it. If a paragraph’s topic sentence doesn’t work with the topic sentences from other paragraphs to substantiate the thesis, then the writer has reason to believe that the paragraph has no function in her paper. The writer might revise the topic sentence, or she might revise the whole paragraph. Second, good theses help writers organize papers because writers use them to roadmap and to summarize arguments.

Papers with good organizations exhibit several features. First, readers can easily identify the theses of those papers, they can identify the function of each paragraph within the papers, and they can see how the paragraphs work together to substantiate or justify the theses.

There are several types of organizations for papers. First, the essay format provides an introduction with an explicit thesis and a clear roadmap of the paragraphs to follow, followed by the paragraphs, followed by a conclusion that reviews the thesis and how the paragraphs jointly justify the thesis. Second, chronological organizations tell stories, often historical, and they have beginnings, middles, and ends. In chronological organizations, writers often relax principles that call for explicit theses and topic sentences. Finally, inverted pyramid organizations give readers the most important information first, and with every paragraph that follows, the information decreases in importance.

You’ll often hear EP researchers say that new EP Encyclopedia writers face a steep learning curve. One cause of the learning curve is the unique organization required of many EP Encyclopedia articles. No EP Encyclopedia articles follow just essay format or just chronological format or just inverted pyramid format. Rather, most of these articles follow a format that requires a mixture. Let’s now see how to write good EP Encyclopedia articles.

How to Write Good EP Encyclopedia Articles

EP Encyclopedia article share a style unique to the Encyclopedia. The style is unique for many reasons. The articles tell histories, they are about science, they are for inclusive audiences, they are encyclopedia entries, and they exist in a digital format. Those features all influence the structure and style of EP Encyclopedia articles. Below, we discuss some of the key features of EP Encyclopedia articles.

First sentences

Pay special attention to the first sentences of your articles. Make sure that you discuss the topic of the paper in your first sentence. As our articles are encyclopedia entries, they don’t begin with hooks, questions, quotes, or evaluations. As our audience includes mostly non-experts, your first sentence should explicitly state the topic and locate it in space and time. Often the topic of
the paper serves well as the subject of the first sentence. If your topic is about some biological concept, make explicit the scope of that concept, especially with regard to the taxa it applies to. Some good first sentences are:

“Johann Gregor Mendel studied plants and their patterns of inheritance in Austria during the nineteenth century.”

“Johann Friedrich Meckel and Antoine Etienne Reynaud Augustin Serres developed in the early 1800s the basic principles of what later became called the Meckel-Serres Law.”

“Mesenchyme is a type of animal tissue comprised of loose cells embedded in a mesh of proteins and fluid, called the extracellular matrix.”

“The Uniform Anatomical Gift Act (UAGA or the Act) was passed in the US in 1968 and has since been revised in 1987 and in 2006.”

“David Starr Jordan studied fish and promoted eugenics in the US during the late nineteenth and early twentieth centuries.”

“The Notch signaling pathway is a mechanism in animals by which adjacent cells communicate with each other, conveying spatial information and genetic instructions for the animal's development.”

“Frederik Ruysch’s cabinet of curiosities, commonly referred to simply as the Cabinet, was a museum Ruysch created in the Netherlands in the late 1600s.”

Significance statements

Significance statements make explicit the significance of your topic for the history of embryology, developmental biology, or reproductive medicine. They have special importance for your articles; they are the theses of your articles. They also align the content of your article with the goals of the EP Encyclopedia. All of your paragraphs should work together to substantiate your significance statements. As theses, significance statements help you excise unnecessary content from your articles, they help you identify the need for your article in the EP Encyclopedia, and they help organize your article.

New writers often struggle to formulate significance statements. Many new writers wrongly think that a topic from any part of biology has a place in the Embryo Project Encyclopedia. The Encyclopedia publishes articles only about topics significant to the history of embryology, developmental biology, or reproductive medicine. If you can’t explain why your topic of interest is significant for those three fields, then you have no thesis relevant to the goals of the EP Encyclopedia.

Writers often revise their significance statements several times. They often start with the phrase: “Topic X is significant to the history of field Y because of reasons Z.” Next, a writer replaces ‘Topic X’ with her topic, ‘field Y’ with embryology or developmental biology or reproductive medicine, and ‘reasons Z’ with the relevant reasons. Next, the writer massages the sentence to remove the formulaic sound of it. Some good significance statements are:

“The Bioethics Act is the first law in South Korea to regulate research on embryonic stem cells and in vitro fertilization.”
“Gonzales created the precedent that anyone who delivers and kills a living fetus could be subject to legal consequences, unless he or she performed the procedure to save the life of the mother.”

“Though current treatments of vesico-vaginal fistulas have evolved since the nineteenth century, some of the basic principles utilized by Sims have been incorporated into present-day surgeries.”

“This study revealed that embryos may be able to control their developmental environment by modifying their behavior.”

“Biologists throughout the twentieth century used Woltereck’s concept of Reaktionsnorm to develop theories and experiments to explain the evolution of adaptive developmental responses to environmental conditions.”

“The bicoid gradient, which extends across the anterior-posterior axis of Drosophila embryos, organizes the head and thorax.”

“While the meaning and significance of the genotype-phenotype distinction has been a topic of debate—among Johannsen’s contemporaries, later biological theorists, and historians of science—many consider the distinction to be one of the conceptual pillars of twentieth century genetics.”

First paragraphs
For any given article, the first paragraph is the most important paragraph. It has the first sentence of the article, and it provides the significance statement. Furthermore, the first paragraph doubles as an abstract of the article. If you use the first sentence to identify your topic and locate it in space and time, and if you place the significance statement near the end of your first paragraph, then you will construct a good abstract and first paragraph.

Keep your first paragraph’s short. Give your readers a flavor of the topic, but not a summary. Finally, we rarely roadmap in EP Encyclopedia articles.

Conclusion paragraphs
Some writers really like conclusions, but EP Encyclopedia articles rarely need them. If you feel you need a conclusion, follow the advice at the end of the specialized style guides.

Organization
EP Encyclopedia articles exhibit organizations that use some elements of essay, chronological, and inverted pyramid patterns, but they don’t rely on any one of those patterns. Like essays, EP Encyclopedia articles have a clear first paragraph that introduces the topic and makes explicit a significance statement, which functions as a thesis. Like chronologies, EP Encyclopedia articles tell the histories of their topics. Often, but not always, most of an article’s internal paragraphs exhibit a chronological pattern. Like inverted pyramids, the content at the beginning of EP Encyclopedia articles is more important than content at the end, and the articles rarely require conclusion paragraphs.
For each article category, look to the good examples of articles for ideas on how to organize your articles.

*Locate things in space and time*

The members of our audience often don’t know the people and things we talk about, and EP Encyclopedia articles need to help them place those people and things in space and time. Everyone you know may know who Lamarck is and when and where he lived, but don’t assume that your readers do.

As you write your articles, when you introduce a new character into your history, briefly say where that person lived during the relevant point in the chronology. The more important you think the character is to the history of your topic, the more specific you should be about that person’s details. If the new character is a scientist, briefly say what biological objects the character studied. For organizations, briefly describe where the organization was located, or where it was headquartered. Some examples:

- **“Two years before** Sharpey described and classified the epithelium, Wilhelm His at the University of Basel, in Basel, Switzerland, expanded the nomenclature of epithelium beyond structural or physiological characters with the introduction of the term endothelium.”
- **“Five years later** Harvard Medical School doctoral student Julia Platt, in Cambridge, Massachusetts, provided evidence based on her studies of *Necturus maculosus* embryos, a type of aquatic salamander, that the mesenchyme that developed into the skeletal elements of the branchial arches derived from ectoderm.”
- **“The impetus for** the creation of the HBF came from Gosney, a citrus magnate who had become interested in the benefits of selective breeding through his work in the Arizona Wool Growers Association, then in Flagstaff, Arizona, and in the development of lemon and orange groves around Los Angeles, California.”

*Biological research, organisms, and taxa*

Often, historians and scientists present the results of biological research with little if any mention of the type of organism the research was conducted on. They do so often to present the results as general beyond the organisms used, so that results from salamander research, for example, appear as if they generalize to amphibians or vertebrates or animals or all organisms.

For EP Encyclopedia article, when we recount the history of an experiment or of some other type of research, we aim to identify the species from which the researchers used organisms. Furthermore, if we can, we aim to identify the level of taxonomic scope that the researchers argued that their results generalized to. The first of those tasks is often easy, and the second is often more difficult.

We identify species for several reasons. Often, readers can imagine individual organisms from species easier than they can identify the mechanisms within those organisms. If a reader must learn about some process, it often helps them just to know that the process happens inside
of some organism and to imagine the organism. Furthermore, if we include species names in our articles, then we can more easily link our content to projects like the Encyclopedia of Life.

When you introduce a species, try to find the common name and the scientific name for the species. Give the common name first, and then the scientific name in parentheses. For example:

Eastern Newt (*Notophthalmus viridescens*)

**Don’ts**

For the EP Encyclopedia, we eschew several practices common to other forms of prose style. Below is a list of things that you should avoid in your articles.

- *Don’t speculate.* Describe events that happened, not what events that could have happened.
- *Don’t write hagiographies.* If you write for the EP Encyclopedia, you probably like science and scientists, and you may develop affinities for your topics. Don’t let those affinities infect your articles. Scientists are not unassailable, benevolent and kindly keepers of all that is good in humanity, so don’t treat them as such, and don’t fawn over their good qualities. EP writers are historians, not cheerleaders.
- *Don’t evaluate.* Encyclopedia articles don’t evaluate their topics. For the EP Encyclopedia articles, we don’t evaluate people, events, technologies, or religions. We don’t write that events are fortunate or unfortunate, that a researcher was the father of a discipline, that a technology was revolutionary, or that concepts were key to a movement. Insofar as you must write an evaluative statement, attribute the statement to another person.
- *Avoid attributing mental states to people.* Rather than saying that Joan believed X, say that Joan said X or argued for X. Rather than saying that Ronald wanted Y, say that Ronald sought Y. Rather than saying that Z intrigued Percy, say that Percy studied Z.
- *Avoid talking about discipline names from the life sciences.* There are important differences between morphology and anatomy, between taxonomy and systematics, between developmental genetics and transmission genetics, between experimental embryology and developmental mechanics, between Darwinian evolutionary biology and Neo-Darwinian evolutionary biology, between evolutionary development and developmental evolution. But for the most part, those differences don’t matter for the EP Encyclopedia’s primary audience in the slightest. Furthermore, discipline names have so much meaning associated with them that they can be daunting for non-specialists. Don’t detail the history of science by cloaking it in a string of discipline names, which remove the objects of study from view. Rather than saying that Cope was a paleontologist, say that Cope studied fossils.
- *Don’t attribute nationalities to people.* People move all of the time, often for strong political reasons. If a scientist born in Germany in 1920 moved in 1935 with her family to Canada, where she lived eighty years and researched, should you call her German or Canadian or German-Canadian? What were her thoughts on her nationality? Often there
is no way to tell, so avoid nationalities altogether. Rather than attributing nationalities to people, locate them in space and time. State the cities and nations they lived in, and state when they lived in those places.
7- Specific Issues of Style

Below is an index of specific issues about style. Pay special attention to capitalization, italicization, and number conventions.

Abbreviations

- No periods are required in degree abbreviations, e.g., PhD and MD.
- Use lower case when referring to any master’s degree but capitalize when specifying actual degree title, e.g., “Master’s of Science.”
- United States of America is abbreviated USA or the US without periods or spaces.
- Similarly, United Kingdom is abbreviated UK.
- Don’t use spaces or punctuation for organization abbreviations, e.g., FDA, NIH, MBL.
- Introduce a person in text by full name the first time, then use last name only.
- Name initials must have periods and a space between initials, e.g., T. H. Morgan.
- For species, give the whole name the first time it appears and use the common abbreviated form thereafter. Capitalize the genus name, but not the species name. Standard abbreviation form is the genus initial (capitalized) and the species name. For example, write *C. elegans* for *Caenorhabditis elegans*. For very common experimental organisms, using only the genus name is permissible, e.g., *Drosophila*, *Xenopus*, and *Bacillus*.
- Do not use ‘%’, but spell out ‘percent’, e.g., sixty percent.

Capitalization, Titles, Headings, and Sub-Headings

- Only capitalize the title of a person or department or the words “university” or “college” when referring to the official name.
- In titles, headings, and sub-headings, capitalize all major words.
- Capitalize named periods of time, e.g., Middle Ages, Renaissance.

City Style

- For cities in the US and Canada, introduce them as City, State/Province, e.g., Toronto, Ontario.
- For all other cities, introduce them as City, Nation, e.g., Freiburg, Germany.
- After you have introduced a city and its state/province or nation in an article, do not include nation or state/province information with further instances of the city’s name.
Dates

- Use day month year format (without punctuation), e.g., 28 August 1956.
- Write dates without commas, e.g., “In May 1894 she joined ….”
- Decades don’t need apostrophes, e.g., 1750s, 1860s, and 1970s.
- Spell out numbered centuries without capitalization, e.g., sixteenth century.
- Capitalize named periods of time, e.g., Middle Ages, Renaissance.

Degrees

- No periods are required in degree abbreviations, e.g., PhD and MD.
- Use lower case when referring to any master’s degree but capitalize when specifying actual degree title, e.g., “Master’s of Science.”
- Terminal doctoral degrees outside of the US and Germany are often not abbreviated PhD. Refer to doctorate degrees as doctorates. If you find documentation that the person earned a PhD, then you may refer to the degree as such.
- Medical degrees are not everywhere abbreviated as MD. Refer to medical degrees as medical degrees. If you find documentation that the person earned an MD, then you may refer to it as such.
- Undergraduate degrees are labeled and abbreviated differently throughout the world. If you cannot find documentation that explicitly names a person’s undergraduate degree, call it an undergraduate degree.

Foreign Words, Names, and Titles

- Italicize non-English words, and include an English translation in parentheses afterwards, e.g. *bauplan* (body plan).
- If a document was published in a language other than English, and you mention that title in the text, give the foreign title and then enclose an English translation in parentheses, e.g.:
  ○ “…then Zhang authored her first book *Wo de yi jiao rensheng* (My Life as a Doctor and Teacher)…”
  ○ “…Mangold’s experiments, which she published in 1924’s “Über Induktion von Embryonalanlagen durch Implantation arfremder Organisatoren” (Induction of Embryonic Primordia by Implantation of Organizers from a Different Species), prompted her to…”
• If a document was published in a language other than English, and you cite that title in your Sources, give the foreign title and then enclose an English translation in brackets, e.g.:
  o Zhang, Lizhu. *Wo de yi jiao rensheng* [My Life as a Doctor and Teacher]. Peking University Medical Press, 2008

**Genes and Gene Products**

• Except for human genes, italicize gene names, but not the names of the genes’ protein products, e.g. *ospA* gene, *OspA* protein.
• Write the names of human genes in all caps and without italicization, e.g. CD5
• Capitalize only the first letter of animal genes, e.g. Mouse Cd5
• Italicize and lowercase virus and fungus gene names, which are usually three letters, e.g. src
• For other issues, follow the CDC guidance on gene nomenclature. http://wwwnc.cdc.gov/eid/pages/scientific-nomenclature.htm

**Hyphens, Em Dashes, and En Dashes**

• Use a hyphen to join a prefix with an adjective, e.g., anti-Darwinian.
• Don’t hyphenate -ly adverbs, e.g., highly developed species.
• Use em dashes—the longest dash—sparingly to indicate a strong break in the sentence.
• Don’t put spaces before or after dashes.
• Use en dashes for “through” in your Sources, e.g., January–March and pp. 234–45.
• Avoid dashes for “through” in your text, e.g., from 1920 through 1925, they weighed from three to four grams.
• On a Macintosh, make an en dash by holding ‘option’ and the hyphen ‘-‘ key, and make an em dash by holding ‘shift’ and ‘option’ and hyphen.
• On a PC and in Word, make an en dash by typing letters, then a space, then two hyphens, then a space, then more letters. The text autocorrects, e.g., word – word. To make an em dash, type letters, then two hyphens, then more letters. The text autocorrects, e.g., word—word.
Italicization

- Italicize non-English words.
- Italicize rather than underline book and journal titles that you refer to in your text.
- Italicize TV show, but not individual episodes nor station names, and movie titles, e.g., the NOVA episode “The Miracle of Life” on PBS.
- Italicize (no underline or bold type) for emphasis, e.g., I really mean it.
- Italicize species names and their abbreviated forms (check Taxonomy).
- Italicize gene names, but not their protein products (check Genes and Gene Products).
- Italicize court decisions in article titles and text, e.g., Weber v. Stony Brook.
- Put titles of articles from journals, magazines, and TV show episodes, in quotation marks, e.g., “1953 and all That: A Tale of Two Sciences,” (1984).
- When possible, upon introducing a piece of literature in an article, include the literature’s year of origination at the end of the piece’s name. See the above bullet for an example. With further instances of the piece’s name within the article, do not include the piece’s year.

Names

- Introduce people and things with their full names.
- After the first use of the full name, if you refer to the person or thing again by name, use only the last name or abbreviated names.
• Use names, not pronouns, when you first talk about people or things in any paragraph.

Nationalities

• Don’t attribute nationalities to people. Instead, locate them in space and time according to City Style.

Nobel Prize

• This is the correct way to refer to the Nobel Prize in Physiology or Medicine. Unless you are only saying “Nobel Prize” in general, use the full and correct title as shown above.

Numbers

• Use Arabic numerals for all units of measure, e.g., 400 mm.
• Spell out whole numbers zero through one hundred, e.g., four liters, thirty-two children.
• Use Arabic numerals for comparisons, e.g., 5 out of 40 mice.
• Spell out numbers related to time (through one hundred), e.g., eighty days, 120 years.
• Major exception: embryonic stages must remain as numerals, e.g., stage 1, etc.
• Do not use ‘%’, but spell out ‘percent’, e.g., sixty percent.

Punctuation and Space Placement

• Use serial commas, e.g., red, white, and blue.
• Commas and periods go inside quotation marks; semicolons, colons, and question marks (if not part of the quotation) go outside.
• Use a comma after city and state or country: “Born in Scandiano, Italy, on ….”
• Use a space between all numbers and units of measure (4 mm).
• Use quotation marks around article titles in text.
• Use one space after the ending of any sentence.

Since/ As

• ‘Since’ is a temporal preposition, not a logical one, e.g. “Since 2000, Phillips has taught in Michigan.”
• When you need a logical preposition, use ‘as’, not ‘since’, e.g., “As he needed wire for the fish, he returned to the store,” not “Since he needed wire…”
Spelling

- Use American, rather than British, spelling.

Taxonomy

- For Linnaean names, italicize genus and species names.
- Capitalize the genus name, but not the species name.
- For species, give the whole name the first time it appears and use the common abbreviated form thereafter.
- Standard abbreviation form is the genus initial (capitalized) and the species name. For example, write *C. elegans* for *Caenorhabditis elegans*.
- For very common experimental organisms, using only the genus name is permissible, e.g., *Drosophila*, *Xenopus*, and *Bacillus*.

Titles

- Don’t refer to people with titles like Professor, Dr., Mr., Md., etc.
- If a person has a British title, such as Sir or Dame, or a Germanic title, such as von, use those titles in People article titles and when you first introduce that person in her People article.
- Introduce a person in text by full name the first time then use last name only.

This/ That

- ‘This’ and ‘that’ have different functions as pronouns.
- ‘This’ is self-referential, e.g., “In this paper, I argue…”
- Only rarely should you use ‘this’ as a pronoun.
- If you use ‘this’ or ‘that’ as pronouns, make sure their referent is clear.

These/ Those

- ‘These’ and ‘those’ have different functions as pronouns.
- ‘These’ is self-referential, e.g., “In these pages I use 500 verbs.”
● ‘Those’ is not self-referential, e.g., “Gilbert had four shelves. On those shelves he had…”, not “Gilbert had four shelves. On these shelves he had…”
● Only rarely should you use ‘these’.

That/ Which

● When you have a clause that describes a subset of the objects to which a word can refer, do not separate the clause with a comma, but use ‘that’ as the first word in the clause. e.g. “She used the frogs that were brown in her experiment.”
  ○ ‘Frogs’ is a word that refers to many animals. The clause ‘that were brown’ describes a subset of those animals. We don’t separate the clause with a comma.

● When you have a clause that further describes the noun immediately before the clause, separate it with a comma and use ‘which’ as the first word in that clause. e.g. “She used the salamanders, which were green, in her experiment.”
  ○ The salamanders she used were each green.
8- Specialized Writing Guides

The guides on the following pages will help you organize your article. The questions within the guides provide entry points for research and ideas about how to link to other EP Encyclopedia articles. Do not treat the guides as checklists, but as starting points to organize your articles. In most cases, you will do better to mimic the style and organization of the articles listed as good examples than you will do to follow exactly the specialized guides.

Some categories of articles are easier to write than others, especially for beginners. People, Experiment, and Technology articles are good articles for beginners to write. Sets of them are also good bases for Organization, Concept, and Context articles. As you start writing your first articles, or you start writing new clusters, start by writing articles of the first three kinds, and then build from them to other kinds of articles. A good strategy is to pick a person for a People article, read her primary works related to embryology, read key secondary literature about her, and then write the article. Then, based on her primary works, which you have already read, write Experiment, Literature, and Technology articles.

The criteria for each category are suggestions to help you research your topic and order your article. Your topic may not meet all of the criteria. If you cannot answer many of a category’s questions for your topic, then consider different categories.

The formats and paragraph numbers are also suggestions. Once you learn how to write EP Encyclopedia articles, then you may write your articles with formats different from the suggested ones.

Many of your articles will rely on old books and articles as primary sources. Always check to see if you can find those documents at the following sites. If you find the complete documents, list the links to the appropriate pages in your Sources.

Biodiversity Heritage Library: http://www.biodiversitylibrary.org/

Google Books: http://books.google.com/

The Internet Archive: http://www.archive.org/
Specialized Guide for PEOPLE Entries

Notes:
- Always start your research for People entries by checking the Dictionary of Scientific Biography and the National Academy of Sciences online biographies. Also, you should read several of the person’s authored works that are significant for embryology’s history before you write – books, research articles, popular articles, etc.
- This guide focuses on scientists, but People entries can be about non-scientists.

Good Examples:
- Gunther von Hagens (1945- )
- John Bertrand Gurdon (1933- )
- David Starr Jordan (1851-1931)
- Wilhelm Ludvig Johannsen (1857-1927)
- James Marion Sims (1813-1883)
- Etienne Geoffroy Saint-Hilaire (1772-1844)

Title
Use the full name of the person. List the name in order of given, middle, and family name. After the name, include their birth and death years in parenthesis. For people who are still alive, leave the death year blank. Use en dashes to separate the years. Follow the examples under Good Examples.

Introduction (~1 paragraph)
Identify the Person.
- What was or is the full name of the person? If the name is in a language other than English, report both the original name and the English translation.
- When and where did the person live? In what major institutions did she work?
- What were the person’s important experiments, technologies or concepts that are relevant to the description of the person's work?
- Why is the person important to embryology’s history? What are her main contributions?
- Try not to categorize a person into disciplines such as anatomist, biologist, morphologist, etc.
- Don’t ascribe a nationality to the person, e.g. British, German, American, etc.
Body (~5-10 paragraphs)

Retell the person’s history in chronological order.
Address the following questions:

Personal life, family history and personality:
- Who were the person’s parents? Name the mother and father, and list the mother first. How was the person's childhood, if relevant? When and where was the person born? How many siblings? Did the person marry? If so, whom?
- Where did the person go to school? What kinds of degrees did the person earn? With whom did the person study? What are the main features of the person's personality? How did they influence her life and her career?

Scientific Career and Achievements:
- Did the person research? What phenomena did the person research?
- What important aspects of the person’s research applied to embryology or development? Briefly describe that research. Rely on original sources, such as the articles in which the person published her findings.
- Did the person invent any instrument or procedure important to embryology? Did she contribute to the understanding of specific mechanisms or to the discovery of specific entities? Did the person shape or modify key embryological concepts? If so, which ones?
- With whom did the person collaborate? With whom did the person debate, and why and about what?
- Did the person write important books or articles? What are their titles? What are they about? Be specific.
- What are the major institutions where the person worked? Did the person help form any organizations? If so, which? Did she contribute to the growth of preexisting institutions?
- Did the person win any awards? If so, which ones? Is there any institution named after the person?

About the person:
- Are there important biographies about the person? Which ones? Who are the authors and what kind of perspective do they provide on the person's work?
- Are the person's achievements contentious or still debated? If yes, why, and by whom? Report the main aspects of the debate.

Conclusion (~1 paragraph)
Rarely needed. Summarize the person’s contributions to embryology, and reiterate why she is significant to embryology’s history.
Specialized Guide for EXPERIMENT Entries

Notes:

- Articles from journals provide the primary sources for most Experiment articles, but the subjects of Experiment articles are research; the subjects are not the primary sources. It’s appropriate to report the titles of the literature in which researchers published their results, but don’t make that literature the subject of your first paragraph or of most of your sentences.
- Report the history of the experiment, tell its beginning, middle, and end. At the middle and at the end, you may treat as subjects of sentences journal articles in which researchers report their work.
- EP Encyclopedia writers have written two kinds of Experiment articles. In the first, EP writers highlight one journal article as a primary source, and the research described in it as the subject of their encyclopedia article. In the second, they report the research described in several journal articles over a span of time. You may follow either format, but if you highlight the research from one journal article, you still must contextualize it with information from other primary sources.
- Experiment articles are about research, so you may write about a study, a survey, a computer simulation, etc., for an Experiment article.

Good Examples:

Highlighting research from a single primary source:

- "Behavioral Thermoregulation by Turtle Embryos" (2011), by Wei-Guo Du, Bo Zhao, Ye Chen, and Richard Shine
- Corticosteroids' Effect on Fetal Lung Maturation (1972), by Sir Graham Collingwood Liggins and Ross Howie
- "Further Experiments on Artificial Parthenogenesis and the Nature of the Process of Fertilization" (1900), by Jacques Loeb
- “On the Nature of the Process of Fertilization and the Artificial Production of Normal Larvae (Plutei) from the Unfertilized Eggs of the Sea Urchin” (1899), by Jacques Loeb

Highlighting research from a series of primary sources:

- The inductive capacity of oral mesenchyme and its role in tooth development (1969-1970), by Edward J. Kollar and Grace R. Baird
- Alexis Carrel's Immortal Chick Heart Tissue Cultures (1912-1946)

Title
Name the experiment something you think fits, attribute it to a person or a research group, and bound it within a timeframe. Title your article like:

- Jacques Loeb’s Experiment’s with Artificial Parthenogenesis in Marine Worms (1900-1901)
- China’s First Baby Conceived through In Vitro Fertilization-Embryonic Transfer (1988), by Zhang Lizhu

The editors may change the title of your article later.

Introduction (~1 paragraph)

Identify the experiments.

- State that the subject of your article is an experiment.
- Who conducted the experiment? Use full names. Where were they researching?
- What was the phenomenon investigated in the experiments? What was the problem addressed? What were the main results of the experiments?
- Why is the experiment important to the history of embryology?

Body I (~2 paragraphs)

Provide historical and conceptual background to understand the experiments.

- Who conducted the experiments? Provide basic information about the scientist or the group of scientists.
- What were the specific phenomena that the scientists investigated through the experiments? Be specific. Did the experiments contribute to the discovery of new entities? Be specific. Did the experiments contribute to the understanding of specific mechanisms? How?
- What concepts, theories, and ideas constitute background for the understanding of the experiments? What were the main ideas about the phenomenon at the time the experiments were performed? How did the experiment’s results help change them?
- In what institutional context did the scientists conduct the experiments? Be specific. When, in what country and in what historical period?
- Where are the experiments first described and by whom? In what book or article? Did other articles refer to the experiments in the history of embryonic research?
Body II (~3 paragraphs)
Describe the experiments.
- What procedures did the scientists use to conduct the experiment? Be specific and provide a description of the experiment or set of experiments. Be specific.
- Did the researches test hypotheses? If so, what were they? If not, what other questions were the researchers asking that motivated their investigations?
- What were the instruments used in the procedure?
- Were there specific difficulties that the scientists needed to face in the experiments, technical difficulties, noise factors, or other? How did the scientists overcome them?
- What kind of data did the scientists collect? What kind of observations were they able to obtain? Were the observations unambiguous? Were they contentious? Have other experiments confirmed or overturned the results?

Body III (~2 paragraphs)
Describe impact and consequences of the experiment.
- What were the reactions in the scientific community of the time to the results of the experiments? Are the experiments important for disciplines other than embryology? Are the experiments still mentioned today in the scientific community?
- Has there been opposition to the results of the experiments? Was there a debate about their interpretation in the society of the time? What was the reaction of religious organizations or other social and political institutions?

Conclusion (~1 paragraph)
Summarize the contribution of the experiments to embryology, and reiterate why it is significant to embryology’s history.
Specialized Guide for TECHNOLOGY (Techniques and Instruments) Entries

Good Examples:
James Marion Sims's Treatment of Vesico-Vaginal Fistula
Gunther von Hagens' Plastination Technique
Nuclear Transplantation
2D Obstetric Ultrasound
Ziegler Wax Embryo Models

Title
Use the name of the Technology.

Introduction (~1 paragraph)
Identify the technology.
- What was the full name of the technology? If its original name was not in English, provide the original name. If the technology has both a scientific and a more common name, mention both.
- Who invented the technology? When and where was it invented, and for what purposes?
- Why is the technology important to embryology’s history?

Body I (~2 paragraphs)
Provide historical background to understand the technology.
- Who, in more depth than the first paragraph, invented the technology? In what institutional, cultural and social contexts? Be specific.
- What was the main function of the technology? What were the specific phenomena that it helped to individuate/explain? What concepts, theories, ideas, or other technologies constitute background for the understanding of its invention?
- Where is the technology first described and by whom?
- What experiments have made use of the technology in the history of embryonic research? In what articles were these experiments reported?

Body II (~ 3 paragraphs)
Describe the technology in detail.
(a) for techniques/procedures (~ 3 paragraphs)
- What are the steps of the procedure? Did it change over time? How?
- What are the instruments used in the procedure? Did they change over time?
(b) for Instruments (~3 paragraphs)
- What are the parts of the instrument? How are they assembled? Be specific.
● Is the instrument the improvement version of an older one? If yes, of which one and how?
● In what kind of procedures did scientists use the instrument?

Body III (~2 paragraphs)
Describe impact and consequences of the technology.
● What were the reactions in the scientific community to the invention of the technology? Is the technology important for disciplines other than embryology? Is the technology still used today?
● Was the use of the technology contentious? Is it contentious now?
● What was the reaction of religious organization or other social and political institutions to its use? What are their positions now?

Conclusion (~1 paragraph)
Summarize the contribution of the technology to embryology, and reiterate why it is significant to embryology’s history.
Specialized Guide for LITERATURE Entries about Books

Notes:

- Recent books can be problematic as subjects of EP Encyclopedia entries. The more recent the book is, the harder it is to identify its significance for embryology’s history. If you pick a recent book, look for reviews, popular press articles, and science outreach articles that describe and contextualize it. Those sources will help you identify the significance your topic has for embryology’s history.
- Verb tenses for Literature entries are tricky. When you talk about the history and context of the literature, use past tense. When you talk about the content of the literature, you may use present tense. An example, with differently tensed verbs italicized: “Thomas published his book in 1934. In the book, he argues that fish eat too many tadpoles.”
- Movies also follow the format below.

Good Examples:
Our Bodies, Ourselves (1973), by the Boston Women's Health Book Collective
Form and Function (1916), by Edward Stuart Russell
The Silent Scream (1984)

Title
Use the title of your book in italics as the title of your EP entry, followed by the year of publication in parentheses, then a comma, then ‘by’, and finally the primary authors’ names.

Introduction (~1 paragraph)

Identify the book.

- What is the full name of the book? If the title was in a language different than English, report first the original title and then the English translation.
- Who was (or were) the author(s)? Include both the person’s full name and literary name if the two differ.
- When, where, and by whom was the book published? List all publishing details, including number of editions.
- Why is the book important to embryology’s history?

Body I (~2 paragraphs)

Provide context for the understanding of the book and of its significance to the history of embryology.

- What kind of book is it? Is it a scientific book, a novel, an encyclical letter or something else? In what language was the book written? Was the book translated into other languages?
- What is the main topic of the book? How is the topic addressed?
• Who is the author? Where did she live and where did she work? Was she affiliated with an institution? Was she influenced or motivated by any specific people, theories, or beliefs? What were her intentions while writing the book?
• Did other literature or experiments important to embryology’s history influence the book? If so, which? Be specific?
• Who was the intended audience of the book? Has the audience changed over time? Is it a book for specialists? Is it a popular book?

Body II (~3 paragraphs)

Describe the book in detail.

• How many chapters compose the book? How is it organized?
• If it is a collected work, summarize the most important contributions. Be specific.
• Summarize the content and main theses of the single chapters.
• Is it one volume or more? Does the book contain relevant images or graphs? What is the cover of the book?
• Are there different editions of the book? Did the organization of the book change in the different editions? Did the author introduce new chapters or sections?

Body III (~2 paragraphs)

Describe reception/impact of the book.

• What impact did the book have at the time of its publication? How did the scientific community receive it? Was the book important outside a community of specialists? If so, where, and why?
• What was the book’s impact in the society of the time? Were there important reviews of the book? Did the book provoke important debates?
• What is the history of its circulation? What is the importance of the book now? Who refers to the book? In what way do people refer to it?
• Did the book influence further publications by the author that were important to the history of embryology? If so, which?

Conclusion (~1 paragraph)

Summarize the contribution of the book to embryology, and reiterate why it is significant to embryology’s history.
Specialized Guide for LITERATURE Entries about Articles

Notes:

- Entries that detail specific journal articles about experiments are best as Experiment entries, and not as Literature entries.
- Recent literature can be problematic as subjects of EP Encyclopedia entries. The more recent a piece of literature is, the harder it is to identify its significance for embryology’s history.
- Verb tenses for Literature entries are tricky. When you talk about the history and context of the literature, use past tense. When you talk about the content of the literature, you may use present tense. An example, with differently tensed verbs italicized: “Thomas published his article in 1936. In the article, he argues that fish eat too few tadpoles.”
- From research journals, opinion pieces, review articles, and letters to the editors make good Literature articles.
- Television episodes also follow the format below.

Good Examples:

"The Chemical Basis of Morphogenesis (1952)”, by Alan M. Turing
"Cell Deaths in Normal Vertebrate Ontogeny (1951)”, by Alfred Glucksman
"Mechanistic Science and Metaphysical Romance” (1915), by Jacques Loeb
NOVA’s “The Miracle of Life” (1983)

Title
Use the title of the article as the first part of your EP Encyclopedia entry’s title, followed by the year of the publication in parentheses, a comma, ‘by’, and finally the primary authors’ names. Put the article’s name in quotes. For example, “Induction and Patterning of the Primitive Streak, an Organizing Center of Gastrulation in the Amniote” (2004), by Takashi Mikawa, Alisa M. Poh, Kristine A. Kelly, Yasuo Ishii and David E. Reese

Introduction (~1 paragraph)

Identify the article.

- What was the full name of the article? If the original title was in a language different than English, report the original title.
- Who are the authors? When and in what journal or in what book was the article first published? List all publishing details.
- Why is the article important to embryology’s history?
Body I (~1 paragraphs)
Provide context for the understanding of the article and of its significance to embryology.
- What is the article about? Is it a review article or a research paper?
- How do the authors address their topics? What were their stated motivations? Were they working at the same institution?
- What other literature, technologies, or experiments important to the history of embryology influence the article? Be specific.

Body II (~3 paragraphs)
Describe the article in detail.
- What are the main parts of the article? How did the authors organize the article? Be specific.
- What is the content of the article? What are the conclusions of the article? Be specific.

Body III (~2 paragraphs)
Describe the reception/impact of the article.
- What impact did the article have at the time it was published? Is it a highly cited article? How did the scientific community receive it? How did other communities receive it?
- Is the article still cited? In what way do people refer to it? Are there important, historical works talking about the article and its authors? Did the article lead to future work by the authors? If so, which works?
- What other literature important to embryology’s history did the article influence?

Conclusion (~1 paragraph)
Summarize the contribution of the article to embryology, and reiterate why it is significant to embryology’s history.
Specialized Guide for LAW Entries about Case Laws

Notes:

- Read the original court decision, and any relevant statutes challenged in the court decision, before writing your entry. You can find it on LexisNexis. Do not rely solely upon others’ interpretations of the initial ruling.
- Italicize case law names, and their abbreviations, in your text. Do not italicize them in the title or bibliography of your entry.
- Court systems differ by state, and between state federal levels. You will have to understand the court hierarchy relevant to the jurisdiction in which your case was tried.
- A complete list of the federal court system is located here: http://www.library.unt.edu/govinfo/assets/images/judicialorg.gif/.
- Here is an example of the court system for Virginia: http://www.courts.state.va.us/courts/origchart_jud_system.pdf.
- Do not use the terms ‘plaintiff’ and ‘defendant’, as they differ as the case goes through the different levels of the court system. Refer to the litigants with their names.

Good Examples:
Gonzales v. Carhart (2007)
Berman v. Allan (1979)

Title
Use the title of the case, followed by its year in parentheses.

Introduction (~1 paragraph)

Identify the case.

- What is the case’s name and when was it was decided?
- Where was the case decided and at what level (e.g. state appellate court, state supreme court, US Supreme Court, etc.)?
- What was the ruling/holding/finding?
- Why is this case significant to the history of embryology? Explain in one or two sentences.
Body I (~1-2 paragraphs)

*Provide context to understand the case and its significance to embryology.*

- What was the basic issue that caused someone to file a suit? Describe the main facts of the case. Who were the parties involved? Explain who each of the litigants were.
- If the case is challenging the constitutionality of a statute, what is the name of that statute, and what does that statute say? Who enacted the statute and when?
- On what precedents did the case rely? When and where were they decided?
- Does the case fit into a social or scientific context? If so, which, and how? Be specific.
- Where were any *amicus curia* briefs? If so, who authored them and what did they argue?

Body II (~2-4 paragraphs)

*Describe the legal process in detail.*

- Trace the case’s history of decisions through lower courts. Include relevant dates, rulings, and judges.
- What key legal and scientific concepts were used in the case’s history and who introduced them?
- Did the case rely on any testimony from scientists? If so, whom, and what was the content of that testimony?
- Did the case rely on any literature that was important to the history of embryology? If so, what was the literature?
- If the case relied on precedents, how did the new decision affect how judges use the old precedents?
- Who were the judges that authored the decision, what was the vote of the court, and were there any famous dissenters? If so, why did they dissent?

Body III (~2-3 paragraphs)

*Describe the reaction/impact of the case.*

- What was the scientific and/or social impact of the case ruling?
- Was the case appealed? If so, when, by whom, and to what court? Did the court accept the appeal, and if so, what was the decision? If one of the litigants appealed and the appellate court rejected the case, include that as well.
- How has understanding of the case’s ruling been used through time? Did the case become an important precedent for other laws? If so, which laws?
- Has any literature important to the history of embryology been published regarding the case? If so, what is it, who authored it, and why is it important?
- Is the finding of the case still valid in its jurisdiction? Have courts of similar jurisdiction decided similarly?
- What became of the litigants involved in the case?
Specialized Guide for LAW Entries about Promulgations

Notes:
- Promulgations include legislation, executive orders, statutes, codes, etc.
- Read the original law before writing your entry. Do not rely solely upon others’ interpretations of the law.

Good Examples:
- Uniform Anatomical Gift Act (1968)
- China’s One-Child Policy
- South Korea's Bioethics and Biosafety Act (2005)
- Barack Obama Executive Order 13505, November 2008

Title
Use the title of the law, followed by its year in parentheses. If the law has a common name, use it in the title, but cite the technical name in the sources.

Introduction (~1 paragraph)
Identify the law.
- What is the law’s name and when was it passed?
- Who passed the law, and what was its jurisdiction?
- What did the law say or regulate?
- Why is the law significant to the history of embryology? Explain in one or two sentences.

Body I (~1-2 paragraphs)
Provide context to understand the case and its significance to embryology.
- What was the basic issue that caused someone author the law?
- Who authored the law, and when?
- Did the law rely on any previous laws or literature important to the history of embryology? What were they? How did the new law affect previous laws?
- How does the law fit into a scientific context?
- Was the law associated with any organizations, organisms, or technologies? If so, which, and why?
- How did the law come to be passed? Was the process long and vitriolic, quick, or other?
Body II (~1-3 paragraphs)
*Describe the law in detail.*
- Detail what the law says.
- What key legal and scientific concepts were used in the law and who introduced them?
- Did the law rely on any input from scientists? If so, whom, and what was the content of that input?

Body III (~1-3 paragraphs)
*Describe the reaction/impact of the law.*
- What was the scientific and/or social impact of the law?
- Did the law cause anyone to file a lawsuit? If so, when, by whom, and to what court? Did the court accept the suit, and if so, what was the decision? Did the suit have an appellate process? If so, briefly describe that process. If one of the litigants appealed and the appellate court rejected the case, include that as well.
- How has understanding of law been used through time? Did the law become an important influence for other laws? If so, which laws?
- Has any literature important to the history of embryology been published regarding the law? If so, what is it, who authored it, and why is it important?
- Is the law still valid in its jurisdiction? If not, explain why
- What became of the primary people involved in the law?

Conclusion (~1 paragraph)
Summarize your topic’s contributions to embryology, and reiterate why it is significant to embryology’s history.
Specialized Guide for ORGANIZATION Entries

Good Examples:
Human Betterment Foundation
Oregon State Board of Eugenics
Carnegie Institution of Washington Department of Embryology
General Embryological Information Service, published annually by the Hubrecht Laboratory, 1949-1981
The Marine Biological Laboratory

Title
Use the name of your organization as the title of your EP article. If you are writing about an organization that does not exist anymore, include its years of activity into brackets. For example, look at the third title under Good Examples.

Introduction (~1 paragraph)
Identify the organization.

- What was the full name of the organization? What kind of organization was it, a university, a research institute or something else? If the name was in a language different than English, report first the original title and then the English translation.
- When, where, and by whom was it first established? Be specific. What are the main steps in its historical evolution?
- Why is this organization important to embryology’s history?

Body I (~ 2 paragraphs)
Provide a description of the creation of the organization and of the historical and cultural background.

- Who are the creators of the organization? Where did they live and work? Were they affiliated to other institutions? Were they influenced or motivated by any specific people, theories, believes, religions or movements?
- What concepts, theories, or ideas motivated the creation of the organization? What were the intentions that led to its creation? What was its initial function? Was it a research institution? If yes, what kind of research did people do at the organization?
- What kind of funding established the organization? Did other organizations affect the creation of the organization? Which ones, and how?
Body II (~2 paragraphs)

Describe the historical development of the organization.

- What are the main stages in the development of the organization? Did the organization change significantly over time? If yes, how and why? According to what ideas? Depending on what social and historical circumstances?
- Who held significant leadership roles in the organization? Include full names, specific job, titles, dates of appointment, and any other useful information.
- Who were the main people that worked at the organization? How did they contribute to the history of embryology with their research?
- Are there any concepts or ideas or discoveries that developed specifically in that organization? Important technologies did people invent while at the organization?
- Are there important journals or books that published by the organization?

Body III (~2 paragraphs)

Describe the relationship of the organization to other institutions in the society of the time.

- What impact did the organization have in the society of the time? Did the impact change over time?
- Did the agenda of the organization conflict with the ideas of religious institutions or other political or social organizations?
- Did the kind of work done at the organization provoke important debates? Are there important monographs or article that discuss with those issues?

Conclusion (~1 paragraph)

Summarize the contribution of the organization to embryology, and reiterate why it is significant to embryology’s history.
Specialized Guide for CONCEPT Entries about Mechanisms or Entities

Notes:
- Concept article are difficult for people new to the EP. We recommend you write CONCEPT articles only after you have written articles on more concrete subjects, such as PEOPLE and EXPERIMENTS.

Good Examples:
Mechanisms:
The Notch Signaling Pathway in Embryogenesis
The Process of Implantation of Embryos in Primates
Gastrulation in Mus musculus (common house mouse)
Entities:
Mesenchyme
Epithelium
Spemann-Mangold Organizer
Bicoid
Enamel Knots

Title
Use the name of the mechanism or entity.

Introduction (~1 paragraph)
Identify the mechanism or entity.
- What is the name of the mechanism or entity? Does it have both a scientific and a more common name, for instance one due to its discoverer? Provide both.
- What are the main features of the mechanism or entity?
- Who are some key people associated with the concept?
- Why is the mechanism or entity important to the history of embryology?

Body I (~2 paragraphs)
Contextualize (conceptually and historically) the mechanism or entity.
- Who discovered the mechanism or entity, and when? Did those scientists receive awards for their investigations? In what historical periods did they operate? In what institutions?
- What kind of instruments allowed the discovery of the mechanism or entity? Are there important experiments that facilitated the discovery?
- What are the most important publications that explain or elucidate the mechanism or entity?
• Did ideas of the entity or mechanism change over time? If the mechanism or entity has a long history as object of scientific inquiry, mention the most important steps of its investigation.
• What other concepts are important to understand the topic?

**Body II (~3 paragraphs)**

*Describe the current understanding of the mechanism or entity.*

In the description, refer to the most relevant and recent articles or books on the topic.

(a) for *entities*:
• What kind of entity is it (molecular, genetic, cellular)? What are its main characteristics?
• In what kind of mechanisms does the entity operate? At what level of biological organization? Be specific.
• What are the most recent instruments that facilitate the investigation of the entity?
• What happens if the entity has some structural or functional defects? Are there specific diseases that derive from these defects? Be specific.

(b) for *mechanisms*:
• What are the main parts that constitute the mechanism? How does the mechanism operate? At what level of biological organization? Is it a genetic, cellular, or evolutionary mechanism?
• What are the main stages that characterize the operation of the mechanism? Be specific.
• What happens if the mechanism does not work properly? Are there specific syndromes or disorders that derive from a defective operation of the mechanism?

**Body III (~2 paragraphs)**

*Describe if and how investigations of the mechanisms caused public debates*

• Did the investigation of the mechanism or entity cause debate in the scientific community?
• Does the investigation of the mechanism or entity raise ethical questions? If yes, in what context and why?

**Conclusion (~1 paragraph)**

Summarize the importance of the mechanism or entity to the history of embryology.
Specialized Guide for CONCEPT Entries about Theories and Movements

Good Examples:
Theories:
- Wilhelm Johannsen's Genotype-Phenotype Distinction
- John von Neumann's Cellular Automata
- The Meckel-Serres Conception of Recapitulation
- The Source-Sink Model
- Richard Woltereck's Concept of Reaktionsnorm
Movements:
- Spermism
- Preformationism in the Enlightenment

Title
Use a common name for the theory or movement, include a time period, if it is relevant.

Introduction (~1 paragraph)
Identify the theory or movement.

- What was or is the full name of the theory or movement? If the name is in a language other than English, report both the original name and the English translation.
- Who are the most important people or institution that contributed to the theory or movement?
- When and where was the theory or movement created? When and where did it develop?
- What was the theory or movement about?
- Why is this movement or theory important to embryology’s history?

Body I (~2 paragraphs)
Describe the origins and development of the theory or movement.

- Who are the main people that contributed to the elaboration of the theory or movement? When did they live? Where did they work? In what institutions? Be specific.
- Did the theory or movement spread quickly? Why or why not? Did it find resistance in the scientific community of the time? If so, why?
Body II (~2 paragraphs)

*Describe the main conceptual aspects of the theory or movement.*

- What were the main problems that the theory addressed? What were the specific embryological phenomena that it helped to individuate/explain? What were the main ideas and values that characterized it?
- Did the theory or movement oppose other specific theories and movements? If yes, which ones? Did the theory or movement represent the evolution of an old one? If so, what were the older theories that it referred to?
- What are the kinds of results produced by the use of the theory? Are there important experiments that were performed by proponents of the theory or movement? Are there important publications?
- Are there specific instruments or procedures that people developed to test or apply the theory?

Body III (~2 paragraphs)

*Describe the Reaction to the theory or movement.*

- Did the theory or movement stimulate debate in the society of the time? Did it address issues that were ethically contentious?
- Did the movement have a political agenda? Did it contribute to the creation of important institutions? Do those institutions still exist?
- Do religious or social institutions express an opinion about the theory or movement?
- Did the theory or movement influence the production of specific laws?

Conclusion (~1 paragraph)

Summarize the contribution of the theory or movement to embryology, and reiterate why it is significant to embryology’s history.
Specialized Guide for CONCEPT Entries about Diseases, Syndromes, and Disorders

Notes:

- Concept entries about diseases, syndromes, and disorders are not like webMD articles. The EP Encyclopedia doesn’t aim to help people identify and self diagnose health issues. Write your article to tell the history of how researchers came to use a concept, how they identified a phenomenon, and how that concept has changed over time.

Good Examples:

- Birth Defects Caused by Agent Orange
- The Discovery of Fetal Alcohol Syndrome
- Pre- and Post-natal Growth Deficiencies and Fetal Alcohol Syndrome
- Niemann-Pick Disease

Title

Title your entry after the most commonly used name for the disorder, be it vernacular or scientific. If the most commonly used name is scientific, you may include a common vernacular name in parentheses after the scientific name, and vice versa.

Introduction (~1 paragraph)

*Identify the disease, syndrome, or disorder.*

- What is the name of the disease, etc.? Does it have both a scientific and a more common name, for instance one due to its discoverer? Report both.
- What are the main features of the disease? Provide a definition and a brief description of its causes and of its consequences.
- Why is the disease important to embryology’s history?

Body I (~2 paragraphs)

*Provide the conceptual and historical context for the understanding of the disease, etc.*

- Who are the most important scientists or personalities that contributed to the understanding of the disease? When and where did they work? Did they publish their results? Did they receive important awards?
- What are the main experiments that facilitated our understanding of the causes of the disease? Did our understanding of the disease change over time?
- What kind of instruments and procedures were used for the prevention or cure, if any, of the disease? Are they actually effective? Did they change over time?

Body II (~4)
Describe the current understanding of the disease
- What is the current explanation for the occurrence of the disease? Do we know the mechanisms that cause? Be specific.
- How does the disease develop? How and when in the process of development is it possible to detect it? Through what kind of instruments and procedures?
- Are there standardized procedures to cure or prevent the disease? Who invented them? When?
- Is there consensus in the scientific community about the cures of the disease? If not, present the main ideas and highlight the areas of conflict.

Body III (~2 paragraphs)
Legal and ethical issues about the syndrome
- What is the position of major religious authorities about the cures or the prevention of the disease?
- Are there laws that specifically regulate the cure or prevention of the disease?

Conclusion (~1 paragraph)
Summarize the main characteristics of the disease, and reiterate why its investigation is significant to embryology’s history.
Specialized Guide to Writing IMAGE Entries

Good Examples:
Images of Embryos in Life Magazine in the 1950s
Hartsoeker’s Homunculus Sketch from Essai de Dioptrique (1694)

Title
Titling EP entries about Images can be difficult. Use the title of the image EP article, followed by a comma, ‘by’, the primary creators’ names, and the year of the publication parentheses. If that format will not work, follow one of the examples above, or create one specific to your topic. Make sure you include year(s) in the title.

Introduction (~1 paragraph)
Identify the image.
- What does the image portray? What is it about?
- Who created the image? Include the person’s full name and the date of creation. Where did they create it?
- How was the image created? Briefly introduce basic information about the medium. Is it a photograph, oil painting, sculpture, digital, or other?
- Why is the image important to embryology’s history?

Body I (~2-4 paragraphs)
Provide the historical and cultural background for the understanding of the image.
- What were the specific topics that the image portrayed?
- Why did someone create the image? Was it for educational, artistic or other reasons? Who influenced the image’s creation? Be specific.
- What concepts, theories, ideas, or movements constitute background for the understanding of its creation? What ideas or concepts did the image advance?
- What was the intended audience of the video? Who was supposed to use the image?
- Who created the image? Where and when?
- How was the image created? Elaborate on techniques and tools involved in the image’s creation, e.g., new photographic techniques, microscopy, etc.
- Did the image appear first on a textbook, in a journal article, in the personal files of an artist or scientist, or other? Provide full names for those who have owned the image or original video.
- Did the artist or creator collaborate with anyone?
Body II (~2-3 paragraphs)

Describe the image.

- What does the image portray exactly? What are the peculiarities of the image?
- What features of the image are relevant to the history of embryology? Be specific.

Body III (~1-3 paragraphs)

Describe impact and consequences of the image.

- Chronologically trace the history of the places that displayed the image: magazines, books, journals, newspapers, art galleries, museums, the internet, text books, etc.
- What were the reactions in the scientific community to the production of the image? Is the image important for disciplines other than embryology? Is the image still displayed or used today?
- Was the image contentious because of its content? Is it contentious now? What was the reaction of religious organization or other social and political institutions to its production? What are their positions now?

Conclusion (~1 paragraph)

Summarize the image’s contributions to embryology, and reiterate why it is significant to embryology’s history.
Specialized Guide for CONTEXT Entries

Notes:

- Context articles are especially difficult. You cannot write them well until you understand how the EP Encyclopedia relationships work, and have written many accessible, atomist articles. For those reasons, student contributors may not write Context articles unless they have already fully developed an interrelated cluster of articles.
- Consider focusing on a scientific context, a political context, a religious context, etc.

Good Examples:
Discovery of Fetal Alcohol Syndrome  
Reassessment of Carrel’s Immortal Tissue Culture Experiments  
Seedbanking 1900-1979

Title
There is no formula for titling context articles. Work for something that captures the breadth of the period, and try to include the period in the title.

Introduction (1-2 paragraphs)
Identify the context.

- Introduce the context in one or two sentences.
- Why is this context important to embryology’s history? Explain in one or two sentences.
- How did this context come to matter in embryology? Include dates and consider the relevant social, political, cultural, and scientific actors that influenced its creation, interpretation, and implementation.
- How has the meaning of the context changed over time? Who and what influenced this change?

Body (many paragraphs)
Describe the context.

- Describe the social, cultural, political, and/or scientific factors that influenced the context. Explain its history. What individuals or institutions promoted its use, definition, or meaning, and for what purposes?
- Who was part of the context? Which experiments, technologies, locations, organizations, concepts, literature, laws, and religions constituted the context?
- Describe how its interpretation has changed over time as a reflection of the interactions between individuals and institutions relevant the context’s history.
- What other contexts, problems, theories, or ideas influenced the creation of context?
- What other contexts emerged?
Conclusion (~1 paragraph)
Summarize your topic’s contributions to embryology, and reiterate why it is significant to embryology’s history.
9- Sources and Citation Style

Though you are encouraged to use them when you draft articles, published EP Encyclopedia articles have no footnotes or endnotes. Furthermore, quotations and parenthetical citations are appropriate only rarely and only with approval from your editor. Each article concludes with a list of sources. List only the sources used in your research. Each article should cite at least two to five scholarly books or journal articles, depending on the topic.

You may also cite popular press articles, presentations, and websites, but those sources generally may not be your primary information sources. Academic sources should provide the backbone of your research. In general, others of your sources must be trustworthy. For website, avoid most .coms and even many .orgs, as those sites tend to have missions that strongly color how they present information.

The EP Encyclopedia’s citation style follows the fifteenth edition of *The Chicago Manual of Style*. Below are some general considerations and examples of citation style. If you have a question of style not covered in the following pages, refer to *The Chicago Manual of Style*, and for issues of legal style, refer to *The Bluebook: A Uniform System of Citation*.

Some general considerations:

- Double space your citations.
- Use the heading “Sources” rather than “References.”
- Alphabetize your sources by authors’ last names. With more than one source from an author, order by publication date.
- Always list the full first names of authors.
- List all authors of a work. Never use ‘et al.’.
- Use en dashes for inclusive page ranges, e.g. “1149–51” not “1149-51.”
- Abbreviate ‘editor’ to ‘ed.’, and ‘translator’ to ‘trans.’, but for non-standard positions spell out the title completely. (e.g. transcriber, annotator).
- For articles from online and open access journals, provide links to the articles. For articles from subscription journals accessed through an institutional library, do *not* provide links to the articles.
- When possible, for articles and books now in the public domain, provide the website from which you can find them. Common sources are:
  - Biodiversity Heritage Library: [http://www.biodiversitylibrary.org](http://www.biodiversitylibrary.org)
Common Citation Formats:

Books

- One author
  

- Two authors
  

- Four or more authors
  

- Editor, translator, or compiler instead of author
  

- Editor, translator, or compiler in addition to author
  

- Chapter or other part of a book
  


[http://presspubs.uchicago.edu/founders/](http://presspubs.uchicago.edu/founders/)  
(Accessed March 27, 2011).

**Journal Articles**

- Article in a print journal


- Article in a non-Open Access print journal accessed online


- Article in an online-only journal

(Accessed August 30, 2013).
Popular magazine article


Newspaper article


Book review


Thesis or dissertation


Paper presented at a meeting or conference


Laws

- Case Law
  - State Tort Court
    Weber v. Stony Brook Hospital, 60 N.Y. 2d 208 (1983).
  - State Appellate Court
  - Federal Tort Court
    United States v. Dennis, 183 F. 201 (2d Cir. 1950).
  - US Supreme Court
    Roe v. Wade. 410 U.S. 113 (1973)
• Legislation
  ○ US Federal Legislation

  ○ State Legislation

Web site


E-mail

John Doe, e-mail message to author, October 31, 2005.

Reference Works

• Dictionary of Scientific Biography

  (Note: no date or publisher information required for this resource only.)

• Biographical Dictionary of Women in Science

  (Note: inclusion of the entry author[s] and the book editors.)
10- Page and File Name Formats and Sample Articles

Below is a description of the format your articles should have before you turn them in for editing. Afterwards are instructions for file name formats. The following pages are examples of properly formatted articles. The examples only show their first and last pages.

Page Format

- Use 12 point Times New Roman font.
- Double space throughout, including your sources.
- Use bold, twelve-point Times New Roman font for your title. Your title should be left justified and the first line of your page.
- Hit ‘enter’ twice between the end of your title and the start of your first paragraph.
- Indent the start of every paragraph.
- Put right justified page numbers in your footer sections.
- After your final line of text, hit ‘enter’ twice and then type your name, as you want it to appear on the website, right justified.
- After your name, hit ‘enter’ twice and left justify the word ‘Sources’. Bold it, and attach a colon so you see Sources:.
- After Sources:, hit ‘enter’ twice and list your sources as described in the citation style section.
- For your sources, use hanging indents, as demonstrated in the example articles.

File Name Format

You will likely turn your articles in online. Save your articles as Word documents and use the following naming conventions.

- Start with the category abbreviation, e.g. Pe for people and Exp for experiment.
- Next use your articles title, or for long titles, understandable abbreviations.
- Finish with your initials.
- For an experiment article about parthenogenesis by Cera Lawrence, the file name is ExpParthenogenesisCL.doc.
- The file naming convention for People articles is slightly different. Use Pe, then the person’s last name, her first and middle initials, followed by your initials. For example, a people article by Ellen DuPont about John Philip Trinkaus is named PeTrinkausJPED.doc.
Johann Gregor Mendel (1822–1884)

Johann Gregor Mendel studied plants in Austria during the nineteenth century. His work initiated our current understanding of inheritance. Mendel experimented with the pea plant, *Pisum*, and the publication, “*Versuche über Pflanzenhybriden*” (“Experiments on Plant Hybridization”), published in 1866, revolutionized theories of trait inheritance. Mendel’s discoveries relating to factors, traits, and how they pass between generations of organisms enabled the twentieth-century scientific community to build theories of genetics.

Born on 22 July 1822 in Heinzendorf, Austria, now Hynčice, Czech Republic, Mendel was the second child of Rosine and Anton Mendel. He had two sisters, Veronica and Theresia, with whom he spent his youth working on the 130-year-old, family owned farm. This work fostered Mendel’s interest in nature that later motivated his genetic experiments.

At the urging of the vicar and village schoolmaster, Mendel attended a secondary school and gymnasium. In 1840 Mendel entered the philosophy course at the Palacký University of Olmütz, now Olomouc, Czech Republic. During his three years in Olomouc, Mendel studied philosophy, physics and mathematics, and he was beset with financial worries. Due to fiscal pressures, Mendel entered the Augustian St Thomas’s Abbey in Brünn, now Brno, Czech Republic, in 1843, to continue his education. At this time Mendel, born Johann Mendel, adopted the name Gregor and began his scientific work, taking on many roles including...

Amanda Andrei

Sources:


Jacques Loeb’s Experiment’s with Artificial Parthenogenesis in Marine Worms (1900-1901)

Jacques Loeb showed that scientists could achieve artificial parthenogenesis with one species of annelid worm through a series of experiments in 1900. Loeb published the results of his experiments in 1901 as “Experiments on Artificial Parthenogenesis in Annelids (Chaetopterus) and the Nature of the Process of Fertilization,” in The American Journal of Physiology. His results broadened the range of animals to which artificial parthenogenesis applied beyond sea urchins. Scientists could now also cause artificial parthenogenesis with the eggs of Chaetopterus, a segmented marine worm.

Loeb had detailed his earlier experiments with sea urchins in two papers: “On the Nature of the Process of Fertilization and the Artificial Production of Normal Larvae (Plutei) from the Unfertilized Eggs of the Sea Urchin” in 1899 and “Further Experiments on Artificial Parthenogenesis and the Nature of the Process of Fertilization” in 1900. The three sets of experiments were Loeb’s initial breakthrough with artificial parthenogenesis, and they prompted years of research, which culminated in his 1913 book Artificial Parthenogenesis and Fertilization.

Loeb conducted his research with Chaetopterus at the Marine Biological Laboratory in Woods Hole, Massachusetts, following a winter spent researching sea urchins at Stanford University’s Hopkins Marine Station in Pacific Grove, California. He had determined the various mixtures of salt waters that...

Steve Elliott
Sources:


11- Bibliography and Websites

Embryo Project


https://docs.google.com/a/asu.edu/file/d/0B68mpBzv7Wd5bHVNWJKRn15cm8/edit (Accessed August 31, 2013.)

Digital HPS


Embryo Project Context


**Writing**


**Websites**


Embryo Project Encyclopedia. [http://embryo.asu.edu/](http://embryo.asu.edu/)

EP Encyclopedia Editing

EP Encyclopedia Writing Seminar [https://sites.google.com/a/asu.edu/embryo-project-fall-2013/](https://sites.google.com/a/asu.edu/embryo-project-fall-2013/)


History of the MBL Project [http://history.archives.mbl.edu/](http://history.archives.mbl.edu/)

History and Philosophy of Science Repository, [http://hpsrepository.asu.edu/](http://hpsrepository.asu.edu/)

Others:
