

# Histopathological changes in the intestine of *Channa micropeltes* infected with the cestode *Senga rostellariae*

*by Marina Hasssan*

---

**Submission date:** 24-May-2023 03:48PM (UTC+0800)

**Submission ID:** 2100685381

**File name:** 2019\_Hassan\_IOP\_Conf.\_Ser.\_Earth\_Environ.\_Sci.\_370\_012055.pdf (1,022.37K)

**Word count:** 2126

**Character count:** 11663

PAPER • OPEN ACCESS

## Histopathological changes in the intestine of *Channa micropeltes* infected with the cestode *Senga rostellariae*

To cite this article: Marina Hassan *et al* 2019 *IOP Conf. Ser.: Earth Environ. Sci.* **370** 012055

<sup>1</sup> View the [article online](#) for updates and enhancements.

### You may also like

- [Patient-specific microdosimetry: a proof of concept](#)  
Joseph M DeCunha, Fernanda Villegas, Martin Vallières et al.
- [Establishing a survival prediction model for esophageal squamous cell carcinoma based on CT and histopathological images](#)  
Jinlong Wang, Lei-Lei Wu, Yunzhe Zhang et al.
- [Computer analysis of histopathological images for tumor grading. 2](#)  
Włodzimierz Klonowski, Anna Korzynska and Aneta Chwala



Benefit from connecting  
with your community

## ECS Membership = Connection

### ECS membership connects you to the electrochemical community:

- Facilitate your research and discovery through ECS meetings which convene scientists from around the world;
- Access professional support through your lifetime career;
- Open up mentorship opportunities across the stages of your career;
- Build relationships that nurture partnership, teamwork—and success!

Join ECS!

Visit [electrochem.org/join](https://electrochem.org/join)



7

## Histopathological changes in the intestine of *Channa micropeltes* infected with the cestode *Senga rostellariae*

Marina Hassan<sup>1</sup>, Muhammad Syafiq Izzuddin Abdul Hadi<sup>2</sup>, Mohd Fazrul Hisam Abd Aziz<sup>2</sup>, Wahidah Wahab<sup>1</sup>, Farizan Abdullah<sup>1</sup>, Shuhaimi Deraman<sup>1</sup>, Kismiyati<sup>3</sup> and Mohd Ihwan Zakariah<sup>1</sup>

<sup>1</sup>Institute of Tropical Aquaculture and Fisheries Research (AKUATROP), Universiti Malaysia Terengganu, 21030 Kuala Nerus, Terengganu, Malaysia

<sup>2</sup>Faculty of Fisheries and Food Sciences, Universiti Malaysia Terengganu, 21030 Kuala Nerus, Terengganu, Malaysia

<sup>3</sup>Department of Fish Health Management and Aquaculture, Faculty of Fisheries and Marine, Universitas Airlangga, Surabaya, Indonesia.

E-mail: marina@umt.edu.my

**Abstract.** *Channa micropeltes* or *toman* is a native freshwater fish species and not commercially species in Malaysia. The fish become one of the anglers' attractions to Kenyir Lake, especially for recreational fishing purpose. However, parasitic diseases are one of the most common problems for this fish population. Studies on parasites of *C. micropeltes* is essential to our knowledge for the maintenance of natural resources. So, the objectives of this study were to identify the cestode and observe the histopathological changes on gastrointestinal tract of infected *C. micropeltes*. About 15 *C. micropeltes* were caught by using fishing rod. The fish were pithing, dissected and gastrointestinal tract was removed, then placed on petri dish. The stomach and intestine were fixed in 10% buffered formalin and proceed for preparing histology slides by using standard method for histology. Then, the tissues were stained by using hematoxylin and eosin (H & E) stain. The tissue changes were described. The cestodes were collected, fixed in 70% ethanol, stained with aceto-carmin and prepared the permanent slide. The cestodes morphology were observed under microscope for identification. In this study, only *Senga rostellariae* was identified. The histopathological changes showed the intestine with severe villus damage with destruction of villi epithelium and necrosis. Some areas with cross section of cestode showed increase of goblet cells and generated necrosis. Based on this study, *S. rostellariae* was a dominant species, and its activities caused severe damage to the fish intestine. The conditions can cause death to the fish due to hemorrhage and malabsorption of nutrient.

### 1. Introduction

*Channa micropeltes* are native to the fresh waters of Southeast Asia, Malaysia, Thailand, Indonesia, Myanmar, and India [1]. The fish are inhabiting all parts of Malaysia and usually, they prefer lakes, reservoirs, canals, rivers and most of it commonly deep, standing or slow-flowing water [2]. It is a common species found in Kenyir Lake. The *C. micropeltes* is a daytime predator, feeding on fishes, frogs, and birds. They are very aggressive and even attacking humans. The aggressiveness and strong swimmers attracted anglers seek for recreational fishing purpose.



Content from this work may be used under the terms of the Creative Commons Attribution 3.0 licence. Any further distribution of this work must maintain attribution to the author(s) and the title of the work, journal citation and DOI.  
Published under licence by IOP Publishing Ltd

In Kenyir Lake, *C. micropeltes* commonly are infected with ectoparasites such as *Argulus* sp and Monogenea (Unpublished data). Shaharom (2012) [3] reported the cestode infection in the intestine of *C. micropeltes*. However, adult cestode is common parasites in digestive tract of fishes [4]. The parasitic infections are sometimes very fatal and cause high mortalities when their life cycles are well supported by intermediate hosts [5]. The serious mechanical injuries occurred with high numbers of cestodes and inflammatory reactions may occur in association with mature worm and plerocercoid larvae [4]. The depth of penetration of some species various and depended on fish hosts [6]. This study is important because, in wild, the rate of infection and effect of the cestode are unknown. Thus, this study aimed to identify the species of cestode and describe the severity of pathological changes of intestine caused by the cestode infection.

12

## 2. Materials and methods

### 2.1. Fish sample

Fish samples of *Channa micropeltes* (n=10) were collected from Lake Kenyir, Terengganu and their weights (g) and lengths (cm) were measured using a measuring board. Next, pitching method was applied by cutting the fish's spinal cord to make it paralyzed. After that, the fish was cut open using scissors up from the anus to the bottom of the jaw and the gastrointestinal tract was taken out and placed on petri dish. Gastrointestinal was divided into 3 part; stomach, proximal intestine, and mid intestine. Each end portion was fastened using a thread and was injected by 3 ml syringe with needle that contained 10% buffered formalin solution. Fixed sample in urine bottle contained 10% buffered formalin solution for histology. Sample of cestode was collected and fix in 70% ethanol.

### 2.2. Identification of cestode

Cestodes were fixed in AFA solution; alcohol, formalin, and acetic acid. It then being stained with aceto-carmin and put on the slide, covered with a coverslip to prepare the permanent slide [7]. The structure/illustrations of the Cestodes were drew by using Lucida camera which fitted on Olympus Microscopes under 4X magnification.

### 2.3. Histopathological studies

The infected tissue of *C. micropeltes* was taken out and fixed in 10% buffered formalin solution. Then it being dehydrated, clarified with xylene and processed for preparation of paraffin wax blocks [7]. Next, the tissue was cut at 4 - 5µm thickness rotary microtome and was put on slides. The tissue was stained with hematoxylin and eosin (H & E) for histopathological analysis and being observed under a light microscope. Lastly, the photo of the tissue was captured and being described if any damage caused by Cestode on *C. micropeltes* gastrointestinal tract presented.

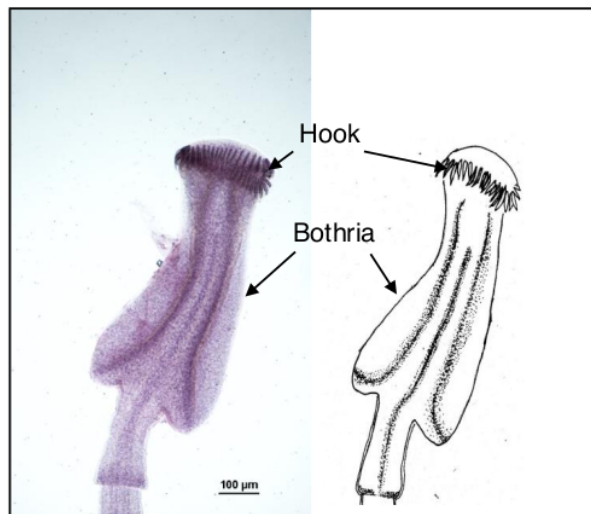
8

## 3. Results and discussion

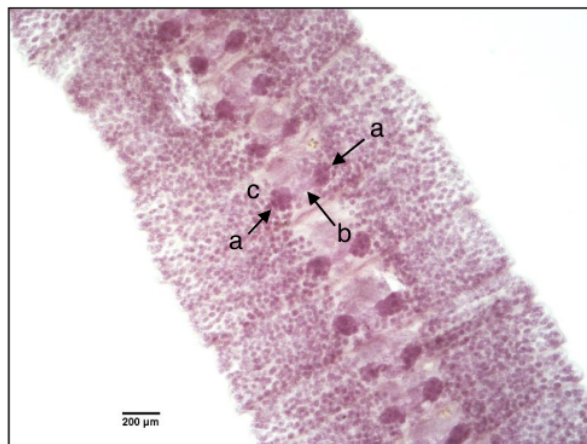
### 3.1. Result

**3.1.1. Identification of cestode.** The morphology of the present cestode consist structure of scolex, hook and bothria at the head (Figure 1) and mature proglottid structure consist testes and ovary (Figure 2). All proglottids are much broader than long. Immature proglottids have no trace of any reproductive organs. Mature proglottids are medium in size with almost straight lateral margin, quadrangular in shape and slightly broader and longer. Mature proglottids have developing ovary, testes, and vitelline follicles and arranged in a cluster.

The ovary is medium size, distinctly bilobed, transversely situated in the posterior region. Ovarian lobes are irregular margin, big size, and lobulated. Isthmus is connecting the two ovarian lobes, slightly curved, transversely placed and near the posterior margin. Testes are medium in size, round in shape, crowded together and some overlapping on each other. The vitellaria are follicular.



**Figure 1.** *Senga rostellariae*. Head region. (A) The head region stained with aceto-carmine (B) drawing by camera lucida.



**Figure 2.** *Senga rostellariae* showed mature proglottid. (a) Ovary (b) Isthmus (c) testes. 100× total magnification Scale bar 200 μm.

### 3.1.2. Histopathological studie<sup>16</sup>

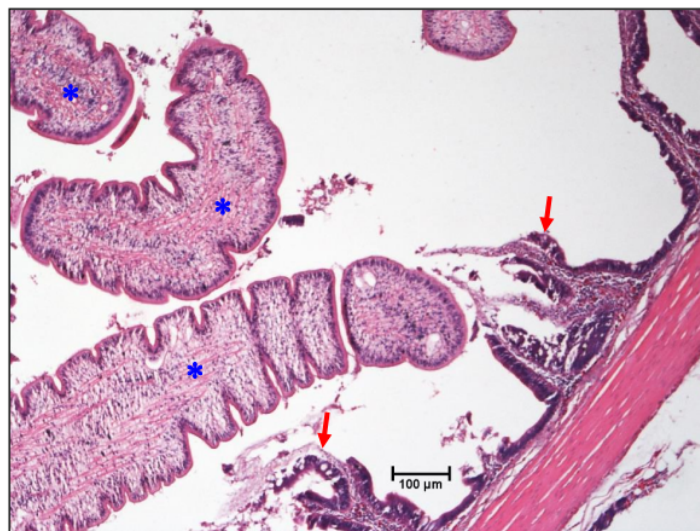
The cestode was found lying in the lumen of the intestine. The intestinal layer pale and filled with mucus in the lumen. The lumen of intestine full with the body of cestode and most of the head embedded in the intestinal wall (figure 3).



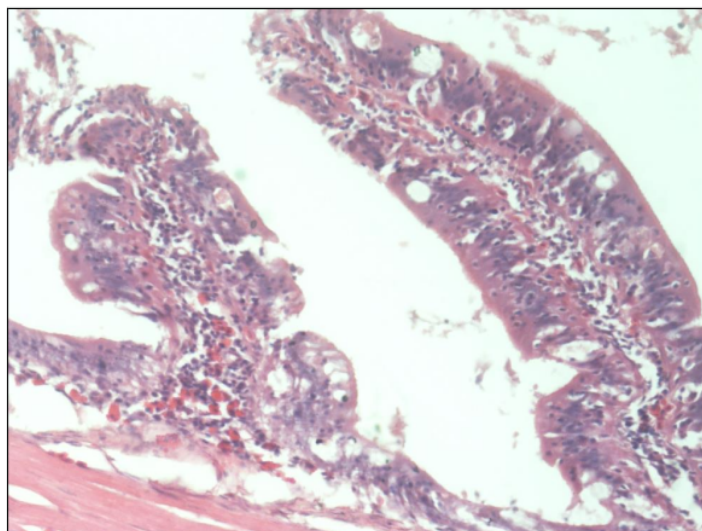


**Figure 3.** Cestode in the lumen of the intestine.

The pathological effect exhibited ruptured serosa layer, inflammatory infiltration at the infected area, shortened and irregular shaped of villous. However, in the heavy infestation with the cestodes showed the breakage, hemorrhage, and separation of villous processes with large space (figure 4). There were also highly distribution of goblet cells in the villous (Figure 5). The epithelial necrosis was noticed (figure 4).



**Figure 4.** Cross-section of cestode (★) and destruction of villi and necrosis (arrow) (H & E; x10



**Figure 5.** The infected intestine showed highly distribution of goblet cells, infiltration of inflammatory cells, and hemorrhage. (H & E; x40)

### 3.2. Discussion

The internal and external organ of the *S. rostellariae* was described to compare other *Senga* spp. which is important for identification. However, the *Senga* spp found in *C. micropeltes* in this present study were different from species *S. parva* and *S. filiformis* [8]. Based on the morphological descriptions, the present cestode is *Senga rostellariae* [9].

The type of scolex is covered with numerous hooks and has related to severe damages of the intestinal wall. The hemorrhage occurred when the scolex reached and damaged to the blood vessel. In the case of helminths infection, Haque and Siddiqi (1978) [10] reported that the surface desquamation of mucosal epithelium, infiltration of eosinophils and plasma cells.

The severe infection was evidenced by the total eruption of villi from the mucous membrane which resulted to a major disruption of the structural organization of the intestine which might have a profound influence on the nutrition and digestion process of the fish. The degree of pathogenicity and damages were depended on the intensity of infection [11,12]. The *S. rostellariae* blocking the intestinal lumen and disrupt the overall absorption efficiency of the intestine which affects fish's growth by restricting its food intake.

### 4. Conclusion

The cestode found in *C. micropeltes* was only *S. rostellariae*. The severity of tissue changes or damages were related to the intensity of cestode infection. The severe damage to the intestine of fish showed that *S. rostellariae* is pathogenic. The damages might cause the fish has digestive disturbance and lead to physiological problems.

### References

- [1] Ambak M A, Mansor M A, Z. M and Mazlan A G 2012 *Fishes of Malaysia* (Malaysia: Universiti Malaysia Terengganu)
- [2] Courtenay W R and Williams J D 2004 *Snakeheads (Pisces, Channidae): a biological synopsis and risk assessment* vol 1251 (US Geological Survey)
- [3] Shaharom F 2012 *Fish Parasite of Lake Kenyir* (Peninsular Malaysia: Universiti Malaysia Terengganu)

- [4] Gaikwad P R, Sonune M B and Nagmote S R 2016 Histopathological Effects of the Cestode parasites on fishes from the Amravati region of Vidarbha (MS) India *Int. J. Life Sci.* **4** 602–5
- [5] Shakir H A, Khan A M and Abid M 2006 The prevalence of cestode infection in a freshwater catfish, *Sperata sarwari* *Punjab Univ. J. Zool* **21** 41–7
- [6] Taraschewski H 1989 *Acanthocephalus anguillae* in intra-and extraintestinal positions in experimentally infected juveniles of goldfish and carp and in sticklebacks *J. Parasitol.* 108–18
- [7] Kaur P 2014 Histo-pathological effect of *Senga* species (Cestode: Pseudophyllidea) in intestine of Piscian hosts. *World J. Pharm. Pharm. Sci.* **3** 1506–13
- [8] Fernando C H and Furtado J I 1964 Helminth parasites of some Malayan fresh-water fishes. *Bull. Natl. Museum, State Singapore.*
- [9] Dhole J S, Sonune B V, Reddy Y R and Chavan R J 2011 Two Pseudophyllidean Tapeworms from fresh water fish *Mastacembelus armatus* of maharashtra state (India) with revised key to species of genus *Senga* *Acta Parasitol. Glob.* **2** 25–33
- [10] Haque M and Siddique A H 1978 Histopathology of pig and man *Indian J. Parasitol.* **2** 97–8
- [11] Benarjee G, Reddy B L, Prasad K S K, Srikanth K, Swamy M, Ramu G and Ramulu K N 2007 Dynamics of parasite population and its histopathological and histophysiological effects in the stomach of a freshwater fish *J. Indian Fish. Assoc.* **34** 47–58
- [12] Reddy B L and Benarjee G 2014 Mode of attachment and Pathogenicity of *Lytocestus indicus* in fresh water Murrels *Int J Curr Microb. Appl Sci* **3** 507–11



# Histopathological changes in the intestine of Channa micropeltes infected with the cestode Senga rostellariae

## ORIGINALITY REPORT

**13%**  
SIMILARITY INDEX

**11%**  
INTERNET SOURCES

**5%**  
PUBLICATIONS

**1%**  
STUDENT PAPERS

## PRIMARY SOURCES

**1** Wlodzimierz Klonowski, Anna Korzynska, Ryszard Gomolka. "Computer analysis of histopathological images for tumor grading", Physiological Measurement, 2018 **2%**  
Publication

**2** [nas.er.usgs.gov](https://nas.er.usgs.gov) **1%**  
Internet Source

**3** [link.springer.com](https://link.springer.com) **1%**  
Internet Source

**4** [www.worldwidejournals.com](https://www.worldwidejournals.com) **1%**  
Internet Source

**5** [updatepublishing.com](https://updatepublishing.com) **1%**  
Internet Source

**6** [nlist.inflibnet.ac.in](https://nlist.inflibnet.ac.in) **1%**  
Internet Source

**7** [www.semanticscholar.org](https://www.semanticscholar.org) **1%**  
Internet Source

**8** [core.ac.uk](https://core.ac.uk)  
Internet Source

1 %

9

Joseph L. Corn, Danny B. Pence, Robert J. Warren. "FACTORS AFFECTING THE HELMINTH COMMUNITY STRUCTURE OF ADULT COLLARED PECCARIES IN SOUTHERN TEXAS", Journal of Wildlife Diseases, 1985

Publication

1 %

10

[hmg.oxfordjournals.org](http://hmg.oxfordjournals.org)

Internet Source

1 %

11

[www.ijirmf.com](http://www.ijirmf.com)

Internet Source

1 %

12

Rabia Shafique, Ahmad Adnan, Riffat Parveen. "Study of Antimicrobial Activity of Tissue Proteins of Sperata sarwari ("singhari"), Family Bagridae", Arabian Journal for Science and Engineering, 2016

Publication

<1 %

13

[e-journal.unair.ac.id](http://e-journal.unair.ac.id)

Internet Source

<1 %

14

[edisciplinas.usp.br](http://edisciplinas.usp.br)

Internet Source

<1 %

15

[irep.iium.edu.my](http://irep.iium.edu.my)

Internet Source

<1 %

16

[krishikosh.egranth.ac.in](http://krishikosh.egranth.ac.in)

Internet Source

<1 %

---

Exclude quotes      On

Exclude matches      Off

Exclude bibliography      On

# Histopathological changes in the intestine of Channa micropeltes infected with the cestode Senga rostellariae

## GRADEMARK REPORT

FINAL GRADE

/0

GENERAL COMMENTS

Instructor

PAGE 1

PAGE 2

PAGE 3

PAGE 4

PAGE 5

PAGE 6

PAGE 7

## CLAIM

Take an arguable position on the scientific topic and develop the essay around that stance.

---

ADVANCED	The essay introduces a precise, qualitative and/or quantitative claim based on the scientific topic or text(s), regarding the relationship between dependent and independent variables. The essay develops the claim and counterclaim fairly, distinguishing the claim from alternate or opposing claims.
PROFICIENT	The essay introduces a clear, qualitative and/or quantitative claim based on the scientific topic or text(s), regarding the relationship between dependent and independent variables. The essay effectively acknowledges and distinguishes the claim from alternate or opposing claims.
DEVELOPING	The essay attempts to introduce a qualitative and/or quantitative claim, based on the scientific topic or text(s), but it may be somewhat unclear or not maintained throughout the essay. The essay may not clearly acknowledge or distinguish the claim from alternate or opposing claims.
EMERGING	The essay does not clearly make a claim based on the scientific topic or text(s), or the claim is overly simplistic or vague. The essay does not acknowledge or distinguish counterclaims.

## EVIDENCE

Include relevant facts, definitions, and examples to back up the claim.

---

ADVANCED	The essay supplies sufficient relevant, accurate qualitative and/or quantitative data and evidence related to the scientific topic or text(s) to support its claim and counterclaim.
PROFICIENT	The essay supplies relevant, accurate qualitative and/or quantitative data and evidence related to the scientific topic or text(s) to support its claim and counterclaim.
DEVELOPING	The essay supplies some qualitative and/or quantitative data and evidence, but it may not be closely related to the scientific topic or text(s), or the support that is offered relies mostly on summary of the source(s), thereby not effectively supporting the essay's claim and counterclaim.
EMERGING	The essay supplies very little or no data and evidence to support its claim and counterclaim, or the evidence that is provided is not clear or relevant.

## REASONING

Explain how or why each piece of evidence supports the claim.

---

ADVANCED	The essay effectively applies scientific ideas and principles in order to explain how or why the cited evidence supports the claim. The essay demonstrates consistently logical reasoning and understanding of the scientific topic and/or text(s). The essay's explanations anticipate the audience's knowledge level and concerns about this scientific topic.
----------	--



PROFICIENT	The essay applies scientific reasoning in order to explain how or why the cited evidence supports the claim. The essay demonstrates logical reasoning and understanding of the scientific topic and/or text(s). The essay's explanations attempt to anticipate the audience's knowledge level and concerns about this scientific topic.
DEVELOPING	The essay includes some reasoning and understanding of the scientific topic and/or text(s), but it does not effectively apply scientific ideas or principles to explain how or why the evidence supports the claim.
EMERGING	The essay does not demonstrate clear or relevant reasoning to support the claim or to demonstrate an understanding of the scientific topic and/or text(s).

## FOCUS

Focus your writing on the prompt and task.

---

ADVANCED	The essay maintains strong focus on the purpose and task, using the whole essay to support and develop the claim and counterclaims evenly while thoroughly addressing the demands of the prompt.
PROFICIENT	The essay addresses the demands of the prompt and is mostly focused on the purpose and task. The essay may not acknowledge the claim and counterclaims evenly throughout.
DEVELOPING	The essay may not fully address the demands of the prompt or stay focused on the purpose and task. The writing may stray significantly off topic at times, and introduce the writer's bias occasionally, making it difficult to follow the central claim at times.
EMERGING	The essay does not maintain focus on purpose or task.

## ORGANIZATION

Organize your writing in a logical sequence.

---

ADVANCED	The essay incorporates an organizational structure throughout that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence. Effective transitional words and phrases are included to clarify the relationships between and among ideas (i.e. claim and reasons, reasons and evidence, claim and counterclaim) in a way that strengthens the argument. The essay includes an introduction and conclusion that effectively follows from and supports the argument presented.
PROFICIENT	The essay incorporates an organizational structure with clear transitional words and phrases that show the relationship between and among ideas. The essay includes a progression of ideas from beginning to end, including an introduction and concluding statement or section that follows from and supports the argument presented.
DEVELOPING	The essay uses a basic organizational structure and minimal transitional words and phrases, though relationships between and among ideas are not consistently

clear. The essay moves from beginning to end; however, an introduction and/or conclusion may not be clearly evident.

EMERGING

The essay does not have an organizational structure and may simply offer a series of ideas without any clear transitions or connections. An introduction and conclusion are not evident.

LANGUAGE

Pay close attention to your tone, style, word choice, and sentence structure when writing.

---

ADVANCED

The essay effectively establishes and maintains a formal style and objective tone and incorporates language that anticipates the reader's knowledge level and concerns. The essay consistently demonstrates a clear command of conventions, while also employing discipline-specific word choices and varied sentence structure.

PROFICIENT

The essay generally establishes and maintains a formal style with few possible exceptions and incorporates language that anticipates the reader's knowledge level and concerns. The essay demonstrates a general command of conventions, while also employing discipline-specific word choices and some variety in sentence structure.

DEVELOPING

The essay does not maintain a formal style consistently and incorporates language that may not show an awareness of the reader's knowledge or concerns. The essay may contain errors in conventions that interfere with meaning. Some attempts at discipline-specific word choices are made, and sentence structure may not vary often.

EMERGING

The essay employs language that is inappropriate for the audience and is not formal in style. The essay may contain pervasive errors in conventions that interfere with meaning, word choice is not discipline-specific, and sentence structures are simplistic and unvaried.