

分子生命科学特別講義（1単位）のお知らせ

テーマ：「Effective communication in English for scientists」

講師：堀内 純二郎（東京都医学総合研究所 Scientific Advisor and Senior Scientist）

授業の目的：purpose

There are two main goals for my lectures. One is to teach students how to organize their thoughts in a logical framework in order to effectively communicate in English. The second is to teach students about Pavlovian associative memory, and how this type of memory is learned and stored in the brain. For effective scientific communication, we will focus on understanding what we are trying to explain, and organizing that into a logical progression that most efficiently conveys our thoughts to the audience. For Pavlovian behaviors, we will focus on associative learning and memory in *Drosophila*, where flies learn to associate odors with either painful or rewarding experiences. I will explain how odor and reward and punishment information become associated in the brain to induce plastic changes that regulate behaviors.

授業の概要：outline of the lecture

Lecture 1) *Drosophila* learning and memory.

Introduction to Pavlov and associative learning.

Pavlovian associations in *Drosophila*; flies can learn to associate odors with punishments and rewards.

Neural networks that encode associative learning in the *Drosophila* brain.

The Heisenberg model for associative learning in *Drosophila*.

Lectures 2 and 3) Scientific communication.

Understanding what we are trying to convey to the listener.

Understanding the relationship between our data and a model we develop from the data.

Understanding how strongly or poorly our data support our model.

Understanding how best to present our data within the framework of our model in order for our audience to best understand and evaluate our ideas.

Understanding how to write directly, strongly and convincingly.

Lecture 4) Seminar. Age-related memory impairment in *Drosophila*.

Characterization of age-related memory impairments in *Drosophila*.

Decreased glutamate activity is responsible for age-related impairments in short lasting memory.

Increased glutamate activity during consolidation is responsible for age-related impairments in long-term memory.

Age-related glial dysfunction is responsible for both of these defects.

Lecture 5.1) Final comments on *Drosophila* learning.

Problems with the Heisenberg model in explaining learning in *Drosophila*.

Incorporating prediction error models to develop new models of *Drosophila* learning.

Understanding how memory engrams change upon aging.

Lecture 5.2) Final comments on scientific communication.

Understanding sentence structure and the importance of both short, powerful theme sentences and long complex sentences.

Organizing thoughts into paragraphs, and organizing the flow of a presentation or manuscript.

Clear versus cloudy writing.

授業の進め方： 講義とレポート提出

対 象： 大学院生、※学部3,4年生の聴講も認めますが学部講義を欠席した場合の特別処置はありません

日 時 及 び 場 所：

2月1日 (木) 理学部講義棟 (ビックリーフ) 202 講義室

13:30-14:30

14:50-16:20

2月2日 (金) ウェスト1号館2階 C-201号室

10:30-12:00

13:30-14:30 (セミナー)

14:50-16:20

* 遠隔講義は行いません。

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なお下記セミナーも講義の一部として行います。

セミナータイトル： 「Why does memory decrease as we age? A study in flies.」

「なぜヒトは年齢とともに記憶力が衰えるか？ショウジョウバエを使った研究」

日 時： 2月2日 (金) 13:30~14:30

場 所： 伊都地区：ウェスト1号館2階 C-201号室

* 受講希望者は、1月29日(月)までに、システム生命科学府事務室 (West 1号館 B棟3階 B-306号室) に申し込むこと。

◆◆◆ 分子生命科学特別講義 セミナーのお知らせ ◆◆◆

タイトル: Why does memory decrease as we age? A study in flies.

「なぜヒトは年齢とともに記憶力が衰えるか？ショウジョウバエを使った研究」

講師: 堀内 純二郎 (東京都医学総合研究所 Scientific Advisor and Senior Scientist)

日時: 2月2日 (金) 13:30~14:30

場所: 伊都地区: ウエスト1号館2階 C-201号室

*遠隔講義は行いません。

概要:

As organisms age, their memory decreases. This phenomenon is known as age-related memory impairment (AMI), and it occurs in many species, including humans and the fruitfly, *Drosophila melanogaster*. Here I will present a brief overview of learning and memory in *Drosophila*, and show that aging causes reductions in two types of memory in flies, a short lasting memory that can be measured 1 hr after training, and a protein synthesis-dependent long-term memory. Both of these impairments are caused by an age-dependent decrease in glial activity.

We previously found that age-related impairments in 1 hr memory occur because old glial cells are unable to produce sufficient amounts of D-serine, a neuromodulator important for neuronal glutamate signaling. Consequently, feeding old flies D-serine improves their memory.

Formation of long-term memories (LTM) requires an increase in transcription and protein synthesis. While most groups have studied protein synthesis in neurons, we have found that LTM also requires protein synthesis in glia. During LTM consolidation, glia increase production of a glutamate transporter that shuttles glutamate from synaptic sites into astrocytes. This reduces neuronal glutamate signaling. Old flies are unable to increase production of the glutamate transporter, and consequently are unable to reduce neuronal activity during consolidation.

Altogether, our data indicate that neuronal glutamate signaling needs to be high during formation of short-lasting memories, and low during subsequent consolidation to LTM. Glia support both of these steps by producing D-serine and glutamate transporter. Thus, glial dysfunction in old flies results in defects in two types of memory.

対象: 大学院生、学部4年生、教職員

参加費等: 無料

受講希望者は1月29日(月)までに、システム生命科学府事務室に申し込むこと。

定員: 30名程度

問合先: 九州大学理学部等事務部 システム生命科学府事務室
(伊都ウエスト1号館B棟3階 B-306号室)

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