第 32 回岩手大学 COEフォーラム

岩手大学 21 世紀 COE プログラム「熱ー生命システム相関学拠点創成」では、関連分野において国内外で活発に研究をされている方をお招きしてフォーラム（セミナー）を開催しています。今回は、チェコ科学アカデミー昆虫学研究所・教授Ｆ・Ｓｅｈｎａｌ 氏にチョウ・ガ類シルクの構造と多機能性と題してシルクタンパク質の分子構造と温度・天敵・物理的傷害に対する耐性機構の紹介についてお話をしていただきます。

お忙しいとは思いますが、万障繰り合わせの上、ぜひご参加いただきますようお願い申し上げます。

第 32 回担当・農学部
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日時：2006 年 7 月 26 日（水）16:30～17:30
場所：岩手大学農学部 2 番教室

Ｆ・Ｓｅｈｎａｌ 氏

チェコ科学アカデミー昆虫学研究所･教授

チョウ・ガ類シルクの構造と多機能性

－シルクタンパク質の分子構造と温度・天敵・物理的傷害に対する耐性機構の紹介－

Spiders, spidermites, and several groups of insects produce fibrous materials known as silk from diverse types of glands. Filament formation is based on the interaction of repetitive motifs that make up major part of the heavy chain fibroin (H-fibroin, 200 to 500 kDa). The nature and higher-order assembly of the motifs determine physical properties of the silk fiber. H-fibroin is linked non-covalently to the glycoprotein P25 (25-32 kDa) and by a disulfide bridge to light chain fibroin (L-fibroin, cca 25 kDa). The H-fibroin/L-fibroin/P25 agglomerate is processed from gel to filament in most Lepidoptera; merely Saturniidae secrete silk filaments based on H-fibroin dimers. At least 6 types of sericins were found in the examined species. Their multiplicity is generated by alternative transcript splicing and probably also by differential protein glycosylation. The silk further includes seroins, fibroinase, proteinase inhibitors, antibacterial peptide hemolin, and a few other proteins that are largely produced in the middle silk gland section prior to cocoon spinning and are believed to be responsible for the cocoon resistance to the predators, moulds, and microbes. Spinning a catching net (spiders, larvae of some caddisflies), a commune domicile (webspinners), larval hide (larvae of water midges, caddisflies, and moths), and the cocoon for pupa protection (Neuroptera, Trichoptera, Lepidoptera, Hymenoptera) are common silk deployments. These silk constructions provide protection against biological agents, mechanical damage, UV radiation, temperature extremes, and humidity fluctuations. The functions obviously depend on the mechanical, insulatory, hygroscopic, thermoelectric, and other properties of the silk fibers and webs. The role of silk in thermoregulation is accentuated by the results of thermoelectric measurements on the hornet silk that behaves as a semiconductor, being charged by illumination, warming, and external electric potential and discharged to provide heat and alter humidity.

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