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In-Depth Appreciation of the IP-Based Technology Transfer Process:

The university position explained (The way the University will approach a technology transfer collaboration to solve a problem; What the University will offer and why), the Information Gathering Stage, Negotiation process - information exchanges, CDAs, MTAs, the Term Sheet

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Ryo Arashida

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- Patent attorney in Japan
- Manager of All intellectual propaties(Patents and Trade Marks) of euglena Co., Ltd.



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Our company overview

Euglena, genus of more than 1,000 species of single-celled flagellated microorganisms that feature both plant and animal characteristics





What is *Euglena*? Green bug or not?



Found in 1674 by Leeuwenhoek who invented a microscope. Her(?) name is derived from her red eye. "Eu" and "Glena" mean "Beautiful" and "Eye" in Latin, respectively. People call this "Midori-mushi (green-bug)" in Japan.



Antoni van Leeuwenhoek



Photographs of *Euglena* (Arrrowheads : Eyespot)

Euglena is half-plant, half-animal ?



Euglena belongs to supergroup Excavata and is the only photosynthetic organism in that group.



Euglena's Unique Character 1: Nutrients



Including various nutrients like vitamin, mineral, DHA and EPA.



Vitamins α-carotene β-carotene Vitamin B1 Vitamin B2 Vitamin B6 Vitamin B12 Vitamin C Vitamin C Vitamin C Vitamin E Vitamin K1 Folic acid Niacin Pantothenic acid Biotin

59 varieties

of nutrients

Minerals Zinc Phosphorus Calcium Magnesium Sodium Potassium Iron Manganese Copper

Amino acids Valine Leucine Isoleucine Alanine Arginine Lysine Aspartic acid Glutamic acid Proline Threonine Methionine Phenylalanine Histidine Tyrocine Tryptophan Glycine Serine Cystine

Unsaturated fatty acids

DHA EPA Palmitoleic acid Linoleic acid Linolenic acid Eicosadienoic acid Dihomo γ-Linolenic acid Arachidonic acid Docosatetraenoic acid Docosapentaenoic acid

<u>Others</u>

β-Glucan (Paramylon) Chlorophyll Lutein Zeaxanthin GABA Spermidine Putrescine

Source: analysis conducted by Japan Food Research Laboratories and other institutions

Euglena's Unique Character 2: Paramylon Oeuglena

Uniquely produced in Euglena and absorbs cholesterol and fatty acids.



Image : Aoyama University Prof. Shinichi Fukuoka



▲ Structure of Paramylon granule (Marchessault and Deslandes, 1979)





[▲]Molecular architecture of Paramylon



Euglena's Unique Character 3: Making Oil Oeuglena

Under hypoxic condition, *Euglena* changes paramylon into lipids, which is applicable to Biojet fuels using wax-ester fermentation.



Main products by sales channel





Technology: Mass cultivation of Euglena



In Dec 2005, we became the world's first company to establish the technology for the mass cultivation of Euglena.



(different from the current facilities) demonstrated @ Ishigaki Island, Okinawa Prefecture

Strategy: "5-Fs" cascading use of biomass



Our strategy is to enter "5-Fs" market in order of sales price per weight, with Euglena's potential for a wide range of use.



Our laboratories

We have 4 laboratories and advance each research topic.



Central Laboratory @Yokohama For basic research



Ishigaki Lab @Okinawa pref. For food production



Saga Lab @ Saga pref. For waste water treatment



Algae Energy Lab @ Mie pref. For fuel production

Technology Transfer Process: Collaborative research with university



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University

euglena Co., Ltd.

Tokyo university Tokyo Institute of Technology Shinshu university Mie university Osaka prefecture university Tottori university Kyushu university Saga university etc.

The university and the euglena company jointly filed some patents. In many cases,

Equity : University : euglena = 50 % : 50 %

Cost : University : euglena = 0 % : 100 %



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Thank you for your attention