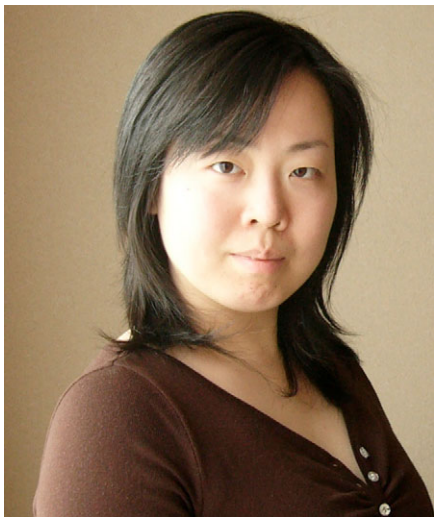
## 2006 Winner: Satomi Matsuoka



We are pleased to announce that the winner of the award for the Best Paper published in 2006 is Satomi Matsuoka for the paper entitled 'Single-molecule analysis of chemoattractant-stimulated membrane recruitment of a PH-domain-containing protein' (Matsuoka et al., 2006).

The prize, $1000, is awarded annually to the first author of the paper that is judged by the Editors and Editorial Board to be the best in which the first author is a student or postdoc of no more than five years standing.

Satomi Matsuoka was born in Osaka, Japan. After graduating from the Faculty of Science at Osaka University, she began her PhD by studying the contribution of membrane lipids to the signaling system in vivo. By molecular genetic and biochemical analyses of *Dictyostelium*, she showed a relationship between a failure to produce a second messenger and an alteration in the fatty acid composition of phospholipids (Matsuoka et al., 2003; Matsuoka et al., 2004).

She then joined the laboratory of Toshio Yanagida at the Graduate School of Frontier Biosciences at Osaka University, where the single-molecule detection technique had been established using total internal reflection fluorescence microscopy and had already been used to visualize single molecules on membranes in living cells (Funatsu et al., 1995; Tokunaga et al., 1997; Sako et al., 2000; Ueda et al., 2001). Satomi focused on a signaling system used in chemotaxis of *D. discoideum*. Chemotaxis is involved in a variety of physiological and pathological processes, and the molecular mechanisms are shared by many eukaryotic cells (Van Haastert and Devreotes, 2004). Small differences in extracellular chemoattractant are converted into localized responses that produce pseudopods predominantly towards the higher concentration. Earlier studies had revealed the main frame of the signaling cascade, where phosphatidylinositol (3,4,5)-trisphospate [PtdIns(3,4,5)$P_3$] serves as a signal determining the direction of movement of the cell and activates downstream pathways via adapter proteins that contain plekstrin homology (PH) domains at the leading edge. However, it remained unclear why this process is so sensitive that the signal can immediately reflect the changes in the gradient orientation. It was difficult to explain the dynamics by such static information as a 'signaling cascade' (an accumulation of causal relationships), and it needed information about the kinetics of each signaling reaction. Satomi therefore visualized single molecules of GFP-tagged, PH-domain-containing proteins. It turned out that these interact with PtdIns(3,4,5)$P_3$ at the leading edge of cells very transiently (Matsuoka et al. 2006). Although it was known that these proteins are localized at the leading edge, the duration of signal transmission is short and the localization is maintained by rapid repetition of each interaction, which should be a molecular basis for the chemotactic sensitivity of the cell under variable environments.

Satomi is now pursuing postdoctoral studies. Funded by Japan Society for the Promotion of Science, she is studying the PtdIns(3,4,5)$P_3$ phosphatase PTEN (phosphatase and tensin homolog deleted on chromosome 10) using single molecule imaging (Vazquez et al., 2006).

**Fiona Watt**
**(Editor-in-Chief)**

### References


**Funatsu, T., Harada, Y., Tokunaga, M., Saito, K. and Yanagida, T.** (1995). Imaging of single fluorescent molecules and individual ATP turnovers by, single myosin molecules, in, aqueous solution. *Nature* **374**, 555-559.

**Matsuoka, S., Saito, T., Kuwayama, H., Morita, N., Ochiai, H. and Maeda, M.** (2003). MFE1, a member of the peroxisomal hydroxyacyl coenzyme A dehydrogenase family, affects fatty acid metabolism necessary for morphogenesis in *Dictyostelium* spp. *Eukaryot. Cell* **2**, 638-645.

**Matsuoka, S., Kuwayama, H., Ikeno, D., Oyama, M. and Maeda, M.** (2004). Defect in peroxisomal multifunctional enzyme MFE1 affects cAMP relay in *Dictyostelium*. *Dev. Growth Differ*. **46**, 195-199.

**Matsuoka, S., Iijima, M., Watanabe, T. M., Kuwayama, H., Yanagida, T., Devreotes, P. N. and Ueda, M.** (2006). Single-molecule analysis of chemoattractant-stimulated membrane recruitment of a PH-domain-containing protein. *J. Cell Sci*. **119**, 1071-1079.

**Sako, Y., Minoguchi, S. and Yanagida, T.** (2000). Single-molecule imaging of EGFR signaling on the surface of living cells. *Nat. Cell Biol.* **2**, 168-172.

**Tokunaga, M., Kitamura, K., Saito, K., Iwane, A. H. and Yanagida, T.** (1997). Single-molecule imaging of fluorophores and enzymatic reactions achieved by objective-type total internal reflection fluorescence microscopy. *Biochem. Biophys. Res. Commun.* **235**, 47-53.

**Ueda, M., Sako, Y., Tanaka, T., Devreotes, P. and Yanagida, T.** (2001). Single-molecule analysis of chemotactic signaling in *Dictyostelium* cells. *Science* **294**, 864-867.

**Van Haastert, P. J. and Devreotes, P. N.** (2004). Chemotaxis: signalling the way forward. *Nat. Rev Mol. Cell. Biol*. **5**, 626-634.

**Vazquez, F., Matsuoka, S., Sellers, W. R., Yanagida, T., Ueda, M. and Devreotes, P. N.** (2006). Tumor suppressor PTEN acts through dynamic interaction with the plasma membrane. *Proc. Natl. Acad. Sci. USA* **103**, 3633-3638.