deficient in these *Gfr* mutants. We also found that *Gfr* is involved in the fucosylation of *N*-linked glycans on Notch and its *O*-fucosylation, as well as those of bulk proteins. However, despite the essential role of Notch *O*-fucosylation, the *Gfr* homozygote was viable. Thus, our results also indicate that the *Drosophila* genome encodes at least one other GDP-fucose transporter that is involved in *O*-fucosylation of Notch. Finally, our results implicate the reduction of Notch signaling in the pathology of CDG IIc.

PHOSPHOINOSITIDE PHOSPHATASE ACTIVITY COUPLED TO AN INTRINSIC VOLTAGE SENSOR

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Changes in membrane potential affect ion channels and transporters, which then alter intracellular chemical conditions. Other signalling pathways coupled to membrane potential have been suggested but their underlying mechanisms are unknown. Here we describe a novel protein from the ascidian *Ciona intestinalis* that has a transmembrane voltage-sensing domain homologous to the S1-S4 segments of voltage-gated channels and a cytoplasmic domain similar to phosphatase and tensin homologue (PTEN). This protein, named *C. intestinalis* voltage-sensor-containing phosphatase (Ci-VSP), displays channel-like 'gating' currents and directly translates changes in membrane potential into the turnover of phosphoinositides. The activity of the phosphoinositide phosphatase in Ci-VSP is tuned within a physiological range of membrane potential. Immunocytochemical studies show that Ci-VSP is expressed in Ciona sperm tail membranes, indicating a possible role in sperm function or morphology. Our data demonstrate that voltage sensing can function beyond channel proteins and thus more ubiquitously than previously realized

CHANGING OF PHOSPHORYLATION STATUS OF MAPKS DURING THE INDUCTION OF ANHYDROBIOSIS IN *POLYPEDILUM VANDERPLANKI*

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Anhydrobiosis is a totally ametabolic state used by for example yeast, tardigrades and nematodes. The larva of the African chironomid Polypedilum vanderplanki can enter anhydrobiosis, and withstand complete desiccation. In P. vanderplanki, specific gene expression is observed during induction of anhydrobiosis. To understand the molecular mechanisms of anhydrobiosis, understanding signal transduction should be essential. However, no study has been reported about this field except for yeast. An osmosensing mechanism in the budding yeast (Saccharomyces cerevisiae) involves a MAP kinase cascade. Mitogen-activated protein kinases (MAPK) are a family of serine/threonine protein kinases widely conserved among eukaryotes and are involved in many cellular programs such as cell proliferation, cell differentiation, cell movement and cell death. Here, we report the changing of activation status of MAPKs during the induction of anhydrobiosis, and discuss the role of MAPKs on the anhydrobiosis in P. vanderplanki.

ULTRASTRUCTURAL STUDY OF THE GRANULES OF THE EPIDERMAL MUCOUS CELLS OF THE LAND PLANARIAN, *BIPALIUM NOBILE*, FOLLOWING PEPSIN TREATMENT

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We reported that the granules of epidermal mucous cells in *Bipalium nobile* can be classified into 6 types based on observation by light and electron microscopy at the 73rd Annual Meeting. These were the lattice (L) granules, the rhabdites (R) and other four types of granules. Of the four, two of them were metachromatic but the others were not metachromatically stained with toluidine blue. Both types uniformly had high or low electron density. In the present study, we examined the disappearance of granules following treatment using the protease pepsin. After 30 minutes, we found a decrease of the four types of granules other than L and R. At 60 minutes, there remained L and R granules, but the others had almost disappeared and metachromasia was not demonstrated. These observations suggest that the four types of granules contain more protein than the L and the R granules and play different rolls from the L and the R.

ANALYSIS OF THROMBOCYTES WITH A MONOCLONAL ANTIBODY IN *XENOPUS LAEVIS*

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Xenopus thrombocytes are nucleated and larger than mammalian platelets derived from megakaryocytes. Murine monoclonal antibodies to *Xenopus* peripheral blood cells were generated, and screened three independent hybridomas that produce immunoglobulin G (IgG). Immunostaining, chemical staining and *in situ* hybridization of *Xenopus* blood cells were comparatively performed to determine the specificity of the antibodies. Among them, T12 antibody was revealed to recognize intact thrombocytes, and was not compete with anti-human GpIIb/IIIa IgG, indicating that the antigen of T12 was not GpIIb/IIIa homologue in *Xenopus*. A thrombocytopenic model was furthermore developed by consecutive intracardiac injections of T12. In this model, the number of peripheral thrombocytes decreased with the nadir occurring at 3 days after injection, and methyl-green pyronine-Y and/or toluidine blue positive blood cells appeared thereafter. T12 antibody should be useful to investigate the cellular origin of thrombocytes and the mechanism(s) of thrombocytopoiesis in *Xenopus*.

IDENTIFICATION OF HEMATOPOIETIC PROGENITORS AND ERYTHROID STIMULATING ACTIVITY IN ADULT *XENOPUS LAEVIS*

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An *in vitro* semi-solid cell culture system was established to enable identification of hematopoietic progenitors in adult *Xenopus laevis*. Cells from putative erythropoietic tissues were cultured in semi-solid methylcellulose medium to form hematopoietic colonies. Serum of adult *Xenopus* with severe anemia induced by phenylhydrazine (PHZ) injections was added to stimulate the erythroid colony formation. CFU-e (colony forming unit-erythroid) was detected in normal liver, and remarkably in circulating blood of anemic *Xenopus*. In addition, red-white mixed colonies were developed from bone marrow and spleen, demonstrating the existence of bi-potential hematopoietic progenitors. As many of the major hematopoietic factors are still unknown in non-mammalian, we examined the erythropoietic activity detected in the anemic serum by this assay to analyze its characteristics. The highest activity was detected in the day4 PHZ-treated serum. Further application of this system should give us important information about *Xenopus* erythropoietin.

MORPHOLOGY AND CHARACTERISTICS OF *XENOPUS* THROMBOCYTES

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To reveal hematopoietic development in *Xenopus laevis*, morphology and cytological characteristics of thrombocytes were studied in comparison to mammalian megakaryocytes/platelets. *Xenopus* thrombocytes are known as large, nucleated, oblong shaped cells. In activated state, they change to round, tightened shape and gather through their function relating to hemostasis and thrombosis. Morphological characteristics such as lobulated nuclear chromatin, granules, microparticles and open canalicular system-like-structures were observed through transmission electron microscopy, resembling key structures of mammalian megakaryocytes and platelets. *Xenopus* thrombocytes were acetylcholinesterase positive, as megakaryocytes in rodents. *Xenopus* thrombocytes were also positive to antibodies against human fibrinogen receptor (GpIIb/IIIa) and thrombopoietin receptor (c-Mpl), indicating that major glycoproteins associated with aggregation, proliferation and differentiation in megakaryocyte/platelet lineage are conserved through phylogeny.

MAGNETIC TESTS AND FERROMAGNETIC RESONANCE ON *DAPHNIA* RESTING EGGS

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Daphnia normally reproduce by parthenogenesis. In unfavourable environments, however, robust resting eggs are induced after they switch to sexual reproduction. Resting eggs can remain viable for decades and survive in the harsh environment of a predator's digestive system. However, there is a little physico-chemical information about the resting eggs itself. A previous study reported the existence of magnetic material in *Daphnia* resting eggs (Kawasaki *et al., Zool Sci.,* 2004). To further study of a magnetic characteristic of *Daphnia* eggs, field-cool (FC) and zero-field-cool (ZFC) measurements were investigated by superconducting quantum interference device (SQUID). FC and ZFC measurements showed that both of (1) superparamagnetic particles and (2) magnetic particles which size is bigger than superparamagnetic particles, exist in the eggs. A detection