

BIO-info 28/2011, 9. september 2011 [BIO: sakslister og møtereferater](#) [BIO-info arkiv](#)  
submission deadline to [bio.info@bio.uib.no](mailto:bio.info@bio.uib.no) is Wednesday 16:00

## Fra toppen!

### Lakselussenteret åpnet!

I dag ble vårt nye Senter for forskningsbasert innovasjon, Sea Lice Research Centre, høytidelig åpnet med taler av fiskeriminister, rektor, og dekan, og med omvisning i laboratoriefasilitetene på Høyteknologisenteret. Dermed er det vi har ventet på lenge, i gang.

Med 200 millioner NOK til rådighet over åtte år, må senterleder Frank Nilsen akseptere at forventningene er store, ikke minst fra en næring som sliter med store luseproblemer. SFI-ordningen setter samarbeid med industri og næringsliv i fokus, med innovasjon som sentral rettesnor for arbeidet. Det blir altså ikke antall artikler i vitenskapelige tidsskrift denne forskningen blir målt på, men ideer og løsninger som kan videreutvikles til nytte for næringen.

Kjenner vi Frank rett, løser han dette på en utmerket måte, der også grunnforskningen får sin viktige del. Senteret og samarbeidskonstellasjonene med industri og næring som dette representerer bygger på tillit mellom næring og universitetsforskning utviklet over flere år med prosjektrettet forskning. Nå er det tid for å tenke de store tankene. Lykke til, Frank!

Vi kommer tilbake med fyldigere reportasje fra åpningen i neste BIO-info.

Hilsen Anders



## Ukens bilde



### Vellykket ekskursjon

Fotograf: **Ivar Rønnestad**

Forskergruppene i søndre ende av 3. etasjen på HIB hadde en særdeles vellykket ekskursjon til Herdla onsdag 31. August. Her er alle fotografert under en kaffepause utenfor hangaren for det tyske jagerflyet som i 2006 ble hevet fra 60 m dyp ved Misje. -Man spiste lunsj på den tidligere biologiske stasjonen, og fikk grundig omvisning på Herdla museum. Som det fremgår var alle meget godt fornøyd.

*You are invited to submit photos (electronically!) for "Ukens bilde". Please include a very short description and credit information. Picture can be of researchers / students in action, technology, organisms, field sites ... Please send your pictures to [bio.info@bio.uib.no](mailto:bio.info@bio.uib.no)*

# Innhold:

Lakselussenteret åpnet!	1
Ukens bilde	1
Siste nytt fra BIO	3
Kostnader ved printing/ printing costs;	3
Siste nytt fra verden rundt oss	4
Evaluering av norsk klimaforskning; Åpning av BI på Marineholmen	4
PhD: disputas og prøveforelesning	5
Midtveiseevaluering: Atif Kamil	5
Avsluttende mastergradseksamen	5
Håvard Husebø	5
Kurs, møter, seminar og arrangement	5
Nye artikler	6
Kapfer; Grytnes; Birks; Telford; Engås; Goksøyr; Isaksen; Nylund; Plotkin; Gerasimova; Rapp; Kamil; Hordvik	6

### Siste nytt fra BIO

Kostnader ved printing/ printing costs;

#### Kostnader ved printing – tenk før du tar fargeutskrift

IT-avdelingen har nå begynt å ta mer systematisk betalt for bruk av pull-printere.

Et fargeark koster ca. 10 ganger mer enn sort/hvitt noe som betyr at vi betaler klart mest for fargeutskrift. Som farge-ark regnes et ark med farge på, uansett hvor lite.

Rapporter viser at ca. hvert femte ark skrevet ut på våre printere, er med farger. For å redusere kostnadene knyttet til utskrift ber vi alle å forsøke redusere fargeutskrifter til det mest nødvendige. Pass og på at printeren pullprintcolor ikke er valgt som standardprinter. Takk!

#### Printing costs – colour prints cost ten times more

The costs for printing pages with colour, no matter how little, costs ten times more than black and white prints. We therefore ask everyone to please print in colour only when needed. Please make sure that the printer "pullprintcolor" is not set as default printer. Thank you!



#### Første Bio-seminaret i haust

Sted: Seminarrom K1 /K2 (1. etg A-blokka),

Tid : Torsdag 15. september, kl 13-14

Speaker: **John Birks**, EECRG:

Ecologists have developed various ways of attempting to predict biotic responses to future environmental, especially climate change, such as population, ecophysiological, and

climate-envelope niche models, experimental manipulations, and direct field observations.

Palaeoecology, the ecology of the past, can provide unique insights into how biota have responded to environmental change in the past. These responses include migration, changing habitat, persistence, extinction, and possibly adaptation. The challenge is to decipher the palaeoecological record of fossil plants and animals preserved in lake sediments in ways relevant to environmental-change ecology. Such attempts are controversial as much palaeoecology has become increasingly divorced from ecological theory and inevitably involve compromises about spatial, temporal, and taxonomic scales. Secrets of the past, as revealed by palaeoecology, can help make informed predictions about future biotic responses to environmental change.

\***Harald Kryvi** has designed a wonderful logo for BIO's seminar series.

#### Takk, Eva!

Fra 12. september trer **Eva Krzywinski** ut av rollen som BIOs første HMS-koordinator. Eva har lagt ned mye tid og arbeid i å bidra til at BIOs skal ha et trygt og sikkert arbeidsmiljø, noe vi er svært takknemlig for. Instituttet ønsker å styrke funksjonen med undervisningstekniker, og Eva skal nå bruke mesteparten av sin stilling til dette.

**Evy Foss Skjoldal** overtar som HMS-koordinator etter Eva samtidig som hun fortsetter som leder for BIOs HMS-utvalg.

#### Animal-Inspired Robots Take a Dip

**Sindre Grotmol's** work with underwater robotics research reported in Discovery News. (Vertebrate Evolution & Development Research Group)

"A new generation of underwater bots that draw from the movements of sharks, sea turtles and fish could lead to lifelike prosthetics, tough amphibious explorers and super-stealth surveillance vessels."

Read more from [Discovery News](#).

# BIO-info

## Nyheter fra Institutt for biologi

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### Brakar Sogn som klimalaboratorium

Leitar etter klimaendringar - Studerer 100 planter

**Vigdis Vandvik** (Ecological and Environmental Change Research Group) sier at "Sogn har glimrande lokaliteter for studiar av klimatiske endringar".

Les mer fra [Sogn Avis på Skjellingahaugen](#)

### Deep molluscan relationships

**Christopher Schander** (formerly of Marine biodiversity, now the new Museum Director) and **Christiane Todt** (formerly of Marine biodiversity, now a researcher at Bergen Museum) have a publication in Nature that uses phylogenomics to reveal new information about the evolutionary relationships among the eight major lineages of Mollusca. [Read more](#). Read more in [På Høyden](#).

### Vitenskapshistorier: Mat eller Miljø?

**Marte Haave**, som fullførte Ph.d.-graden ved UiB og Nifes i vår, sier til På Høyden: "Vi vet at det er målbare mengder miljøgifter i maten vår og i oss. Men hva betyr det om vi har litt miljøgifter i hjernen?" [Les mer](#).

### Sunnmørsposten undrande til Kråkås-kritikk

**Sigurd Olav Stefansson** har kommentarer i saken i kyst.no

Han sier "Etter å ha sett på dei ferska bileta uttalte Stefansson mellom anna:

- Det som skjer i Ørstaelva og i andre elvar i området er svært uvanleg. At villaksstammen på så kort tid eksploderer er svært uventa, faktisk usannsynleg."

Les mer i [Kyst.no](#).

## Siste nytt fra verden rundt oss

Evaluering av norsk klimaforskning; Åpning av BI på Marineholmen

### Vil ha alle klimamiljøene med i evaluering



Forskningsrådet er i gang med en grundig evaluering norsk klimaforskning. Resultatet vil få stor betydning for hvordan denne forskningen innrettes i årene som kommer.

[Les mer](#)

### Invitasjon til BI Bergens offisielle åpning av "Campus Marineholmen"

VELKOMMEN TIL BI BERGENS OFFISIELLE ÅPNING AV "CAMPUS MARINEHOLMEN"

Som nabobedrift her ved Damsgårdssundet er det hyggelig å kunne invitere Deres medarbeidere til vår offisielle åpning av den nye skolen. I tillegg til høytideligheter som hører med, har vi satt sammen et variert faglig og musikalsk program for dagen.

Vedlagt finner dere [invitasjonen til åpningen](#). Vi håper flere medarbeidere i bedriften vil benytte anledningen til å bli kjent med BI Bergen og Campus Marineholmen, og tar i mot påmeldinger fra dere så langt plassen rekker.

### NRC Call for Nominations: Stock Rebuilding Plans for the 2006 FCMRA

You are invited to submit nominations for the new study committee on Evaluating the Effectiveness of Stock Rebuilding Plans of the 2006 Fishery Conservation and Management Reauthorization Act. Send a completed [nomination form](#) to Lauren Harding, Program Assistant [lharding@nas.edu](mailto:lharding@nas.edu). Questions may be addressed to Kim Waddell, Study Director [kwaddell@nas.edu](mailto:kwaddell@nas.edu).

### Links to various biological newsletters

[IMBER E-news](#) Marine Programme at UNEP/GRID-Arendal's [Marine Newsletter](#) [CICERO](#)

### 2007 ASFB Workshop Proceedings

Spatial Management in Fisheries - Now Available [Click Here](#)

### Ledige stillinger for biologer

Mer info finner du [her](#). Stillinger utlyst på BIO finner du nederst til høyre på instituttets [nettside](#).

### PhD: disputas og prøveforelesning

Midtveisevaluering: Atif Kamil

**Atif Kamil: "Characterization of Immunoglobulin isotypes and accessory molecules in Atlantic salmon (*Salmo salar*)"**

Atif Kamil holder torsdag 15. september midtveispresentasjon av sitt ph.d. prosjekt.

Veiledere: Ivar Hordvik, Erling Olav Koppang

Evalueringspanel: Anders Fernø, Kristin Hamre, Heidrun Wergeland, Gunnar Bratbak, Dag L. Aksnes

Tid og sted: 15. september kl. 09.00, Seminarrom K1, 1. etasje Biobyggene, Thormøhlens gt 53B

### Avsluttende mastergradseksamen

Håvard Husebø

**Håvard Husebø: On the significance of interspecific competition between Red-throated Pipits *Anthus cervinus* and Meadow Pipits *A. Pratensis* during the territory establishing phase**

Håvard Husebø holder torsdag 15. september avsluttende presentasjon av sin masteroppgave i Biologi, Biodiversitet, Evolusjon og økologi.

Veileder: Gøran Høgstedt Sensor: Odd W. Jakobsen, Høgskolen i Bergen

Tid og Sted: Torsdag 15. juni, kl. 11:00, Seminarrom K3, 1. etasje, Biobyggene

Alle interesserte er velkommen.

### Kurs, møter, seminar og arrangement

Mer info om kurs, møter, seminar og arrangement etc finner du [her](#).

**International workshop on Reproductive Disorders in Baltic Vertebrate Wildlife**

The Centre for Reproductive Biology (CRU) invites you to the 1st international workshop on Reproductive Disorders in Baltic Vertebrate Wildlife (BALTREP): What is the status of, and the threats to, reproductive health in Baltic region wildlife?

**Date and venue:** December 7- 8, 2011, Evolutionary Biology Centre, Uppsala University, Sweden [Learn more](#).

**NTVA møte 13. september**

Norges Tekniske Vitenskapsakademi, NTVA, inviterer til møte i Bergen

Tirsdag 13. september 2011 kl. 19:00 Sted: Nansensenteret på Marineholmen

Tema: Bruk av lydbylde i utforskning og overvåking av det fysiske miljøet i Polhavet

Foredrag av: Yngve Kristoffersen, professor, UiB

Nærmere informasjon om foredraget på vår [hjemmeside](#).

Møtet er åpent for alle interesserte.

**PRIMO's Next, the Advanced Students Workshop**

Next October will take place in Brazil the second edition of the "PRIMO's Next, the Advanced Students Workshop on Fundamentals of Science, Environment and Health".

The workshop is an initiative of the Biophysics Institute of the Rio de Janeiro Federal University and the PRIMOfconference, to increase curiosity and discuss the fundamentals of science with graduate students, to prepare them for the challenges of environmental sciences in the 21st century.

The workshop will be held in the picturesque city of Búzios, Rio de Janeiro State, Brazil, from the 20th to the 30th October 2011.

Please check the [electronic brochure](#) at or the [Workshop webpage](#). You can also check the [preliminary program](#).

We are selecting students to participate!

# BIO-info

## Nyheter fra Institutt for biologi

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### Velkommen til Bergen kommunes årlige konferanse om klima og menneskerettigheter

Også i år har vi samlet dyktige og engasjerte innledere og kan by på strålende kulturopplevelser.

Velkommen til hotell Norge torsdag 20. oktober!

Påmelding via mail til: [Sidsel.Sorgard@bergen.kommune.no](mailto:Sidsel.Sorgard@bergen.kommune.no) Påmeldingsfrist: 12. oktober

Sted: Radisson Blu Hotell Norg, Nedre Ole Bulls Plass 4, Bergen

Gratis deltakelse. [Lær mer.](#)

### Michelsen Centre Workshop: Gas monitoring in water using optics and nanotechnology

Welcome to a Michelsen Centre workshop and project meeting related to gas monitoring in water using optics and nanotechnology in Bergen 15.09!

Please sign up to the event on the [web-site](#) (does also apply to speakers).

Location: University in Bergen

Auditorium B (Allegaten 66): kl.8.15 – 12

Rom 292 (Bjørn Trumpys Hus): kl. 12.15 – 16

One half of the day will be a workshop focusing on challenges and need for new technology for monitoring of gas in water. The rest of the day will cover the on-going project within MIMT related to this field.

We hope that most of you can take the possibility to attend the entire day.

### The ZNN Conference & PhD course 2011

The Zebrafish Network Norway and the Norwegian Zebrafish Platform are pleased to welcome you to the ZNN 2011 Conference. The ZNN 2011 Conference will take place in Bergen from 4-6 November at Scandic Hotel Bergen City. [See Poster](#)

The ZNN zebrafish.no PhD course 2011 and will be organized in Bergen 30 October-6 November.

[See PhD Course poster](#)     [See PhD Course program](#)

### Friday Microbiology Seminar series

All are invited to attend this seminar series, whose main focus is to provide an informal and interactive forum for presentation of results, exchange of ideas, discussion of proposals, projects and experiments, practice for conference talks, and any other subject with its roots in microbiology.

Please join us every other Friday afternoon from 14:00 in Store Puddefjorden on the 5th floor of the BIO B-building. NB! The time has been moved to 14:00 by popular request so that those leaving the university at 15:00 may also join in.

The first meeting of the Fall semester will take place next Friday, 9 September. Volunteers for presentations are always welcome (and encouraged), please contact Jessica Ray ([jessicalouiseray\[at\]gmail\[dot\]com](mailto:jessicalouiseray[at]gmail[dot]com)) to sign up. Vel møtt!

### UiB seminar: Modernism and Christianity

Please find attached the [seminar programme](#) for the Autumn Term, 2011. All welcome.

## Nye artikler

Kapfer; Grytnes; Birks; Telford; Engås; Goksøyr; Isaksen; Nylund; Plotkin; Gerasimova; Rapp; Kamil; Hordvik

**Kapfer J, Grytnes JA, Gunnarsson U, Birks HJB** (2011) Fine-scale changes in vegetation composition in a boreal mire over 50 years. *Journal of Ecology* 99:1179-1189

**Abstract:** 1. In the face of a rapidly changing environment, long-term studies provide important insights into patterns of vegetation and processes of change, but long-term studies are rare for many ecosystems. 2. We studied recent vegetation changes at a fine scale in a Sphagnum-dominated bog in south Sweden by resurveying part of the bog 54 years after the original phytosociological survey. We used an indirect approach to identify changes in vegetation composition in relation to environment because of a lack of permanent sampling units. By applying a weighted averaging technique, we calculated relative changes in species optimum values for different environmental gradients as

represented by indicator values for light, temperature, pH, moisture and nutrients. 3. Species composition of the mire vegetation has changed significantly over the past five decades, as indicated by significant changes in species frequencies and species optima for the gradients examined. Species with lower indicator values for moisture and light and higher indicator values for nutrients have become more frequent on the mire. In particular, species of trees and dwarf shrubs increased in frequency, whereas typical mire species decreased (e. g. *Trichophorum cespitosum* (L.) Hartm.) or disappeared from the study site (e. g. *Scheuchzeria palustris* L.). 4. Synthesis. Composition of the mire vegetation is found to be dynamic at different temporal and spatial scales. Increased air temperature and nutrient availability in south Sweden over the past few decades may have augmented productivity (e. g. tree growth), resulting in drier and shadier conditions for several species. This study successfully demonstrated the applicability of an indirect approach for detecting long-term vegetation change at a fine scale. This approach is an effective way of using historic and modern phytosociological data sets to detect vegetation and environmental change through time.

Lloyd, J., Moros, M., Perner, K., **Telford, R. J.**, Kuijpers, A., Jansen, E., McCarthy, D. (2011) A 100 yr record of ocean temperature control on the stability of Jakobshavn Isbrae, West Greenland. *Geology* 39:867-870

**Abstract:** An understanding of the interaction between ice sheet dynamics and forcing mechanisms, such as oceanic and atmospheric circulation, is important because of the potential contribution of these processes to constraining models that seek to predict future rates of sea-level change. Here we report new benthic foraminiferal data from Disko Bugt, West Greenland, showing a close correlation between subsurface ocean temperature changes and the ice margin position of the glacier Jakobshavn Isbrae over the past 100 yr. In particular, our faunal data show that warm ocean currents entered a bay, Disko Bugt, during the retreat phases of Jakobshavn Isbrae from A. D. 1920 to 1950 and since 1998. We also show a link between West Greenland ocean temperature and the Atlantic Multidecadal Oscillation, a key climate indicator in the North Atlantic Ocean. The close coupling between the oceans and the cryosphere identified here should be assessed in future projections of sea-level change.

Skaar KL, Jorgensen T, Ulvestad BKH, **Engas A** (2011) Accuracy of VMS data from Norwegian demersal stern trawlers for estimating trawled areas in the Barents Sea. *Ices Journal of Marine Science* 68:1615-1620

**Abstract:** The accuracy of vessel monitoring system (VMS) data, used to determine fishing activity in the trawl fishery for gadoids in the Barents Sea, was studied by observer notes and Global Positioning System (GPS) data from two Norwegian vessels in October 2007. A speed rule of 2-5 knots correctly classified 75-80% of the fishing activity and 85-90% of the non-fishing activity. Linear interpolation between hourly VMS recordings underestimated trawl trajectories by 15%. The median haulwise difference between the VMS and the GPS trajectories was similar to 500 m. The interpolated VMS data are appropriate for mapping the large-scale distribution of fishing effort and the area impacted, but to link fishing activities with small-scale mapping of benthos, more-frequent VMS-update times and more-refined interpolation techniques are required.

David Schwesig, Ulrich Borchers, Laure Chancerelle, Valeria Dulio, Ulla Eriksson, Marinella Farre', **Anders Goksoyr**, Marja Lamoree, Pim Leonards, Peter Lepom, Dean Leverett, Anne O'Neill, Rod Robinson, Katarina Silharova, Jaroslav Slobodnik, PeterTolgyessy, Renaud Tutundjian, Jan-Willem Wegener, David Westwood. A harmonized European framework for method validation to support research on emerging pollutants. *Trends in Analytical Chemistry*, Vol. 30, No. 8, 2011

**Abstract:** Any investigation of environmental processes related to chemical substances or their effects depends on reliable, comparable analytical data. This also holds true for the impact of climate change on occurrence, distribution and effects of emerging pollutants, with respect to which there is particular concern regarding the reliability of analytical data, due to lack of harmonization in method validation and requirements for quality assurance and quality control (QA/QC). We present a recent European approach to developing a harmonized framework for method validation, QA/QC and provision of environmental data on emerging pollutants. The validation approach has been tested and improved by three case studies. We outline the main concept of the validation approach as well as the results of

the case studies. This European validation framework turned out to be a feasible tool to check the fitness for purpose of analytical methods and to improve the reliability of environmental analytical data, particularly for emerging pollutants.

**Isaksen TE**, Karlsbakk E, Watanabe K, **Nylund A** (2011) *Ichthyobodo salmonis* sp. n. (Ichthyobodonidae, Kinetoplastida), an euryhaline ectoparasite infecting Atlantic salmon (*Salmo salar* L.). *Parasitology*:1-12

**Abstract:** Phylogenetic analyses of SSU rDNA sequences have previously revealed the existence of 2 *Ichthyobodo* species able to infect Atlantic salmon (*Salmo salar*L.). *Ichthyobodo necator* sensu stricto (s.s.) is assumed to be a freshwater parasite, while a genetically distinct but undescribed species, *Ichthyobodo* sp. II sensu Todal et al. (2004) have been detected on Atlantic salmon in both fresh- and seawater. In the present study a morphological description of *Ichthyobodo* sp. II from the gills of salmon reared in fresh-, brackish- and seawater is presented, using both light- and electron microscopy. Comparative morphometry show that *Ichthyobodo* sp. II from both freshwater and seawater displays a different cell shape, and is significantly smaller than *I. necator* s.s. Also, ultrastructural characteristics distinguish these two species, notably differences in the attachment region and the presence of spine-like surface projections in *Ichthyobodo* sp. II. Based on both unique SSU rDNA sequences and morphological characteristics, we conclude that *Ichthyobodo* sp. II. represents a novel species for which we propose the name *Ichthyobodo salmonis* sp. n.

**Plotkin A, Gerasimova E, Rapp HT.** 2011. Phylogenetic reconstruction of the Polymastiidae (Demospongiae: Hadromerida) based on morphology. *Hydrobiologia* DOI 10.1007/s10750-011-0823-0

**Abstract:** Phylogeny of the sponge family Polymastiidae was reconstructed based on 25 morphological characters. Twenty-one polymastiid species and three suberitid species, *Suberites domuncula* as outgroup, *Aaptos aaptos* and *A. papillata* as sister groups, were included in the analyses. The reconstructions were done in PAUP\* running heuristic search with the parsimony criterion. We analysed three possible evolutionary scenarios based on three alternative interpretations of the body plan of *Quasillina brevis* and *Ridleia oviformis*: first—*Ridleia* possesses aquiferous papillae whereas *Quasillina* lacks them, second—both genera lack papillae and third—the body in both genera is a single hyperdeveloped papilla. All three scenarios excluded the secondary loss of the papillae in the polymastiid evolution. Scenario 2 also excluded the secondary loss of the regular choanosomal skeleton, while scenario 1 assumed its loss in *Ridleia* and scenario 3 admitted its loss in both *Ridleia* and *Quasillina*. We prioritised scenario 2 due to its maximal parsimony and rescaled consistency index and subsequently favoured the clustering of *Ridleia* and *Quasillina* separately from the monophyletic polymastiid clade. In all three scenarios *Pseudotrachya hystrix* clustered separately from other polymastiids in agreement with the molecular evidence, and thus the exclusion of *Pseudotrachya* from Polymastiidae was proposed. The relationships between *A. papillata*, *Tentorium semisuberites*, *Polymastia uberrima*, the clade *Weberella bursa* + *Polymastia boletiformis* and the main polymastiid clade were ambiguous. Meanwhile, all scenarios showed the non-monophyly of *Polymastia* and *Aaptos*. Our hypotheses should be tested by reconstructions based on larger taxon sampling of hadromerid species and larger sets of morphological and molecular characters before any ultimate taxonomic decisions are taken.

**Atif Kamil**, Knut Falk, Animesh Sharma, Arnt Raae, Frode Berven, Erling Olaf Koppangf, **Ivar Hordvik**. A monoclonal antibody distinguishes between two IgM heavy chain isotypes in Atlantic salmon and brown trout: Protein characterization, 3D modeling and epitope mapping. *Molecular Immunology* 48 (2011) 1859– 1867

**Abstract:** Atlantic salmon (*Salmo salar*) and brown trout (*Salmo trutta*) possess two distinct subpopulations of IgM which can be separated by anion exchange chromatography. Accordingly, there are two isotypic  $\mu$  genes in these species, related to ancestral tetraploidy. In the present work it was verified by mass spectrometry that IgM of peak 1 (subpopulation 1) have heavy chains previously designated as  $\mu$ B type whereas IgM of peak 2 (subpopulation 2) have heavy chains of  $\mu$ A type. Two adjacent cysteine residues are present near the C-terminal part of  $\mu$ B, in contrast to one cysteine



residue in  $\mu$ A. Salmon IgM of both peak 1 and peak 2 contain light chains of the two most common isotypes: IgL1 and IgL3. In contrast to salmon and brown trout, IgM of rainbow trout (*Oncorhynchus mykiss*) is eluted in a single peak when subjected to anion exchange chromatography. Surprisingly, a monoclonal antibody MAb4C10 against rainbow trout IgM, reacted with  $\mu$ A in salmon, whereas in brown trout it reacted with  $\mu$ B. It is plausible to assume that DNA has been exchanged between the paralogous A and B loci during evolution while maintaining the two sub-variants, with and without the extra cysteine. MAb4C10 was conjugated to magnetic beads and used to separate cells, demonstrating that  $\mu$  transcripts residing from captured cells were primarily of A type in salmon and B type in brown trout. An analysis of amino acid substitutions in  $\mu$ A and  $\mu$ B of salmon and brown trout indicated that the third constant domain is essential for MAb4C10 binding. This was supported by 3D modeling and was finally verified by studies of MAb4C10 reactivity with a series of recombinant  $\mu$ 3 constructs