

BIO-info 19/2010, 28. mai 2010 [BIO: sakslister og møtereferater](#) [BIO-info arkiv](#) [BIO special dates](#)
submission deadline to bio.info@bio.uib.no is Wednesday 16:00

Fra toppen!

Siste innspurt

Denne uken har mange brukt til å skrive prosjektsøknader og lese masteroppgaver. En av de som har lest flest prosjektsøknader i det siste er Aud Larsen, vår utmerkete forskningskoordinator gjennom det siste halvannet året. Når vi nå mister Aud tilbake til aktiv forskning i Uni Research og til Frede Thingstads ERC-prosjekt, mister vi en dyktig medarbeider som har hjulpet mange søknader gjennom nåløyet hos NFR og EU.

Mens vi takker Aud for hennes energiske innsats helt til det siste, lyser vi ut stillingen som forskningskoordinator med håp om å få en ny person på plass som kan fylle denne funksjonen, som er en viktig jobb i administrasjonen av et stort vitenskapelig institutt som BIO. Søknadsfristen er 8. juni. Vi satser på mange gode kandidater!

Hilsen Anders



Ukens bilde



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 [Elinor Bartle](mailto:Elinor.Bartle@bio.uib.no)

Marine dager på BIO202

Photographer: **Kjersti Sjøtun**

Dette er situasjonsfoto fra årets "marine dager" på BIO202. Vi jobber i fjøresonen på en av Eggholmene, og inne på holmen har en ærfugl lagt seg på reir. Vi har gått forsiktig omkring den i to dager nå, og den følger interessert med fra reirkanten.



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Siste nytt fra BIO

Påminning BIO-fest 10.juni; Fiskens frie vilje

Påminning: BIO fest påmeldingsfristen går snart ut!



Tid: 10. juni kl 14

Sted: BIO

Vi røper allerede nå at det blir mat & drikke, musikk & dans, diverse aktiviteter & faglig input – men endelig program for dagen offentliggjøres først ved fremmøte i foajéen til kantina kl 14

Frist for påmelding: 31. mai Frist for betaling (100,-) i ekspedisjonen: 31. mai

Sentralkomiteén



Fiskens frie vilje

–Fisken er smartere enn vi tror, sier **Anders Fernø (Akvatisk atferdsøkologi)**. Om den frie viljen finnes, er den felles for både mennesker og fisk, mener biologiprofessor Anders Fernø. Les mer fra [På Høyden](#).

Siste nytt fra verden rundt oss

Et plagieringseventyr vises på Vefvet; Sommerlunch i kantina; Craig Venters kunstige celle omtalt i Dagbladet

Et plagieringseventyr

Invitasjonen til lanseringen av kortfilmen "Et plagieringseventyr" på Verftet nå på fredag.

Invitasjon - Sommerlunsj på Marineholmen

Høyteknologisenteret AS, i samarbeid med Studentsamskipnaden i Bergen (SIB), inviterer til sommerlunsj på Marineholmen torsdag 3. juni kl 11 - 13. [Se fullstendig invitasjon og detaljer](#) om arrangementet i vedlagte dokument.



Vil oppskriften gi oss presist det vi ønsker?

Runar Stokke sent me a tip about this article in Dagbladet about C. Venters artificial cell. [Read more](#).

BIO-info

Nyheter fra Institutt for biologi

Ledige stillinger for biologer

Stillinger utlyst på UiB (herunder stillinger på BIO) finner du [her](#).

now	Opus Bergen er på utkikk etter flere medarbeidere (nyutdannede mastergradstuderter (botanikk el. l.) som er på jobb jakt), og i den forbindelse tenker vi på å utvide fagområdene våre.
various	22 PhD & 6 post-doc: GREENCYCLESII a Marie Curie Initial Training Network
Various in May	5 PhD & Associate Prof & Assistant Prof in Ecology and Environmental Chemistry to the strategic marine research program ECOCHANGE
mid-May – mid-Oct	Volunteer opportunity working with ARCHELON , the Sea Turtle Protection Society of Greece
31.05	CSIRO Postdoc Positions Vacant (Historical reanalysis of impacts of climate change on Australian marine and aquatic organisms), Battery Point, TAS, Australia
07.06	(extended deadline) Administrasjonskoordinator for FME at CMR
20.06	Postdoc in fish endocrinology, University of Gothenburg
20.06	PhD & post-doc , Modelling of the terrestrial biosphere, Biodiversity and Climate Research Centre (BiK-F)
Spring 2010	10 post doctoral positions at The Alexander von Humboldt Foundation and the Cluster of Excellence „The Future Ocean” at the Christian-Albrechts University in Kiel, Germany

Forskning: utlysninger, nye satsinger og prosjekter

Søknadsfristen 2. juni; Forskningskomité i forbindelse med Norges grunnlovs 200-års jubileum



Husk søknadsfristen onsdag 2. juni!

Det nærmer seg søknadsfrist igjen og erfaringsmessig vet vi at det er en del ting søkerne lurer på i siste liten.

[Les mer](#)



Forskerne skal i ilden for jubileet i 2014

En egen forskningskomité i forbindelse med feiringen av Norges grunnlovs 200-års jubileum ønsker fagmiljøene velkommen til en bred samling 17. juni i Oslo.

[Les mer](#)

Mer info om følgende utlysninger og mange flere (inkl. løpende, dvs. uten frister) finner du [her](#)

Husk å sende søknadsutkastet til post@bio.uib.no 1 uke i forveien (gjelder ikke mindre bevilgninger som legater og fonds)

31. mai	EUROFLEETS call for multidisciplinary practical ship-based training courses
02.juni	Regionale forskingsfond
02.juni	Aurora-programmet . Forskerutveksling mellom Norge og Frankrike (IS-AUR)
02.juni	Forskningsrådets hovedsøknadsfrist for HAVKYST , MILJØ2015 , FRIBIO
02. juni	NORKLIMA utenlandsopphold, gjesteforskere og arrangementer

17.aug	Marie Curie individuelle stipend: FP7-PEOPLE-2010-IEF , FP7-People-2010-IIF , FP7-PEOPLE-2010-IOF
01.sep	MATPROGRAMMET : Forskningsprosjekter, KMB
01.sep	NORKLIMA : Virkemidler og politikk for utslippsreduksjoner

PhD: disputaser og prøveforelesninger

Disputas: Paco Cárdenas, prøveforelesninger: Paco Cárdenas, Anne-Grethe Gamst Moen, Bjørn Arild Hatteland

Disputas Paco Cárdenas: Taksonomi og fylogeni hos svamper

Paco Cárdenas disputerer for ph.d.-graden med avhandlingen:

"Phylogeny, Taxonomy and Evolution of the Astrophorida (Porifera: Demospongia)"

Veiledere: Christopher Schander and Hans Tore Rapp

Bedømmelseskomite:

Merit Researcher Timothy Littlewood, The Natural History Museum, UK, Directeur de recherches honoraire au CNRS Nicole Boury-Esnault, Centre d'Océanologie de Marseille, France, Professor Vigdis Lid Torsvik, BIO, UiB

Leder av disputasen: Professor Arild Folkvord, Universitetet i Bergen

Tid og sted: Fredag 4. juni kl. 10:15, Stort auditorium, Thormøhlensgt 55, Høyteknologisenteret, 2.etg, Datablokken, 5008 Bergen

Alle interesserte er velkommen

Paco Cárdenas PhD Forlesning

Paco Cárdenas vil torsdag 3. juni holde forelesning over oppgitt emne for PhD graden.

Tittel: Positive and negative aspects of DNA barcoding

Tid: Torsdag 3. juni kl. 14:15

Sted: Lite auditorium, Thormøhlensgt 55, Høyteknologisenteret, 2.etg, Datablokken, 5008 Bergen

Bedømmelseskomite: Merit Researcher Timothy Littlewood, The Natural History Museum, UK, Directeur de recherches honoraire au CNRS Nicole Boury-Esnault, Centre d'Océanologie de Marseille, France, Professor Vigdis Lid Torsvik, BIO, UiB

Alle interesserte er velkommen

Anne-Grethe Gamst Moen PhD Forlesning

Anne-Grethe Gamst Moen vil fredag 4. juni holde forelesning over oppgitt emne for PhD graden.

Tittel: Thyroid hormones in non-mammalian vertebrates

Tid: Fredag 4. juni kl. 13:15

Sted: Seminarrom K1, 1. etasje Biobyggene, HIB

Bedømmelseskomite: Ivar Hordvik, Karin Pittman, Jon Vidar Helvik

Alle interesserte er velkommen

Bjørn Arild Hatteland PhD Forlesning

Bjørn Arild Hatteland vil fredag 4. juni holde forelesning over oppgitt emne for PhD graden.

Tittel: The strengths and weaknesses of using predators for biological control

Tid: Fredag 4. juni kl. 14:15

Sted: Seminarrom K3, 1. etasje Biobyggene, HIB

Bedømmelseskomite: Harald Kryvi, Jon-Arvid Grytnes, Gaute Velle

Alle interesserte er velkommen

June 20 - July 10	Bermuda Institute of Ocean Sciences	Microbial Oceanography: The Biogeochemistry, Ecology and Genomics of Oceanic Microbial Ecosystems	education@bios.edu
17 July - 1 August	Island of Madeira	3rd EDIT Summer School of Taxonomy	31 May

Nye artikler

Richard Telford, Thorolf Magnesen, Gyda Christophersen, Anita Jacobsen, Ana Gomez, Roderick Nigel Finn, Albert Imsland, **Jon Egil Skjaeraasen, James Kennedy, Audrey J. Geffen, Ivar Ronnestad, Koji Murashita, Ann-Elise Jordal, and Cecile Jolly:**

Christiane Todt: describing new morphological data for use in taxonomy

C. M. Heuer, C. H. G. Müller, **C. Todt**, R. Loesel. 2010. Comparative neuroanatomy suggests repeated reduction of neuroarchitectural complexity in Annelida. *Frontiers in Zoology* 7:13.

Abstract: Paired mushroom bodies, an unpaired central complex, and bilaterally arranged clusters of olfactory glomeruli are among the most distinctive components of arthropod neuroarchitecture. Mushroom body neuropils, unpaired midline neuropils, and olfactory glomeruli also occur in the brains of some polychaete annelids, showing varying degrees of morphological similarity to their arthropod counterparts. Attempts to elucidate the evolutionary origin of these neuropils and to deduce an ancestral ground pattern of annelid cerebral complexity are impeded by the incomplete knowledge of annelid phylogeny and by a lack of comparative neuroanatomical data for this group. The present account aims to provide new morphological data for a broad range of annelid taxa in order to trace the occurrence and variability of higher brain centers in segmented worms.

Thorolf Magnesen, Gyda Christophersen and Anita Jacobsen: changes in lipid metabolism with habitat

Grahl-Nielsen O, **Jacobsen A, Christophersen G, Magnesen T.** Fatty acid composition in adductor muscle of juvenile scallops (*Pecten maximus*) from five Norwegian populations reared in the same environment. *Biochem. Syst. Ecol.* 2010 doi:10.1016/j.bse.2010.04.010

Abstract: Adductor muscle fatty acid (FA) composition was compared in *Pecten maximus* juveniles originating from five locations along the Norwegian coast from 59 N to 65 N to detect possible population differences. Broodstock sized scallops were translocated to sea conditions by a scallop hatchery near Bergen (60 N) before spawning in February 2006. The scallop larvae and juveniles were reared in the same environment for two years and 10 individuals from each population were sampled in May 2007 and in May 2008 for analysis of the FAs in the adductor muscle. The total lipid content determined as total amount of FAs were 5.7 ± 0.3 mg per g tissue, and no significant difference was found among the five populations. The polyunsaturated FAs made up close to 60% of the total, with 20:5n3 and 22:6n3 dominating. The saturated FA content was approximately 30%, while the monounsaturated FA were less abundant (7–10%). The FA composition of the muscles of the five populations was similar within each year, with larger differences between the years. Multivariate, supervised learning method PLS, applied pairwise, showed distinct FA composition, between the scallops from the five locations, indicating population differences. The relatedness between the populations was different in the two years, but the distinct FA profiles of the adductor muscle could be used to distinguish between scallop populations on a local scale. The results indicate habitat-specific lipid metabolism which may have important implications for the scallop aquaculture industry in the context of producing well adapted individuals for the specific locations.

discovered a paradox relating to the leutenizing hormone receptor genes (*lhcr*) in Teleostei.

Ana Gomez and Roderick Nigel Finn: isoform differences may affect hormone activity

Francois Chauvigne, Angele Tingaud-Sequeira, Maria J. Agulleiro, Magdalena Calusinska, **Ana Gomez, Roderick Nigel Finn** and Joan Cerda. Functional and Evolutionary Analysis of Flatfish Gonadotropin Receptors Reveals Cladal- and Lineage-Level Divergence of the Teleost Glycoprotein Receptor Family. *BIOLOGY OF REPRODUCTION* 82, 1088–1102 (2010) Published online before print 3 March 2010. DOI 10.1095/biolreprod.109.082289

ABSTRACT Pituitary gonadotropins, follicle-stimulating hormone (FSH), and luteinizing hormone (LH) act via their cognate glycoprotein hormone receptors (GpHRs), FSH receptor (FSHR), and LH/choriogonadotropin receptor (LHCGR) to regulate gonad physiology. Here, we show that the flatfish Senegalese sole (*Solea senegalensis*) expresses functional isoforms of *fshr* and *lhcgr*, but the genomic origin, ligand activation, and tissue distribution of the receptor transcripts are more complex than expected. By integrating the molecular phylogeny of GpHRs with the syntenic loci of vertebrate orthologs, and by subsequently characterizing the physical maps with the phylogeny of flanking genes, we found that vertebrate GpHRs have undergone a divergent evolution. In Teleostei, *fshr* genes have a common descent and can be classified as *fshra*, whereas *lhcgrb* genes exist as alternatively coded genes even in closely related species. Structural analyses of the receptors revealed that *Fshra* has an elongated ligand-binding domain, containing an extra leucinerich repeat that specifically arose in the Acanthomorpha because of exon duplication. Ectopic expression in *Xenopus laevis* oocytes demonstrated that sole *Fshra* responded to piscine Fsh and Lh, whereas *Lhcgrba* was preferentially activated by its cognate hormone. The expression pattern of sole *fshra* and *lhcgrba* in gonads during the reproductive cycle was consistent with earlier observations wherein *Fshra* regulates ovarian growth and spermatogenesis and *Lhcgrb* triggers gamete maturation, respectively. However, contrary to observations in other teleosts, *fshra* was localized exclusively in Sertoli cells of the testis, whereas *lhcgrba* was expressed in Leydig cells as well as in spermatids. These results demonstrate the presence of alternatively coded *lhcgr* isoforms (*lhcgrba* and *lhcgrbb*) in teleosts and suggest a role of the *lhcgrba* receptor in the differentiation of spermatids into spermatozoa in Senegalese sole.

Albert Imsland: optimal growth conditions for juvenile halibut

Arnþor Gustavsson, **Albert K. Imsland**, Snorri Gunnarsson, Jon Arnason, Ingolfur Arnarson, Arnar F. Jonsson, Heiðdis Smaradottir, Helgi Thorarensen. Growth and blood chemistry of Atlantic halibut (*Hippoglossus hippoglossus* L.) in relation to salinity and continuous light. *Aquacult Int* (2010) 18:433–445 DOI 10.1007/s10499-009-9255-5

Abstract In order to study the possible interactive effects of salinity and photoperiod on growth, feed conversion, and blood chemistry in juvenile halibut, 2,604 (initial mean weight 26.8 g ± 0.2 SEM) juvenile halibut were exposed to six different combinations of salinities (13, 21, or 27‰) and photoperiods [continuous light, C and simulated natural photoperiod (65 N), SNP] for 129 days. Improved (10–20%) growth and 10–24% higher feed conversion efficiency were observed at low and intermediate salinities compared to the high salinity groups. Improved feed conversion efficiency (20%) and temporary growth enhancing effects (10%) of continuous light were observed, but effects faded out as day length in the simulated natural photoperiod group increased. No interactive effects of photoperiod and salinity on growth feed conversion or measured blood chemistry variables (blood sodium, pH level, haematocrit, bicarbonate content, and total carbon dioxide). It is suggested that juvenile Atlantic halibut should be reared at low and intermediate salinities and at continuous light, as this will improve growth and increase feed conversion efficiency.

Albert Imsland: seasonal effects strongest on flesh quality

Bjorn Roth, **Albert Imsland**, Lars Helge Stien, Rian Schelvis-Smit, Snorri Gunnarsson, Atle Foss. The influence of anaerobic muscle activity, maturation and season on the flesh quality of farmed turbot. *Aquacult Int* (2010) 18:461–474 DOI 10.1007/s10499-009-9257-3

Abstract In order to test seasonal, rearing, maturing and anaerobic muscle activity effect on the flesh quality of turbot (*Scophthalmus maximus*) a total of 80 farmed turbot from three different strains from reared under natural or continuous light were killed by a percussive blow to the head in November (winter, Icelandic strain), March (spring, Portuguese strain) and June (summer, domesticated strain (France turbot)). To test the effect of anaerobic muscle activity, 10 fish were on each occasion pre rigor filleted, where one fillet was used as a control, while the other fillet was electrically stimulated using a squared 5 Hz, 10 V pulsed DC for 3 min. All pre rigor fillets were measured for pH, weighed,

wrapped in aluminum foil and stored in polystyrene boxes with ice. After 7 days of storage the fillets were measured instrumentally for pH, drip loss, colour (CIE L* a* b*) and texture properties such as hardness and shear force, while fillet shrinkage and colour (RBG) were evaluated with computer imaging on photographs from a standard lightbox. Results showed that softness of the flesh was mainly influenced by factors associated with growth, such as season, photoperiod and maturation. Anaerobic muscle activity simulated with electrical stimulation caused an increase in drip loss (1%) and loss of shear force (4%), but had no effect on hardness or fillet shrinkage. Computer imaging revealed that muscle contractions related to the electrical stimulus forced out blood from the fillet causing less reddishness for the entire storage period. We conclude that a pH drop upon slaughter associated with anaerobic muscle activity has a minor effect on the flesh quality in the short run, while seasonal/alternatively genetic effects are predominant.

Jon Egil Skjaeraasen and James Kennedy: size-dependent spawning time may alter the link between population demography and recruitment

Jon Egil Skjaeraasen, Richard D. M. Nash, **James Kennedy**, Anders Thorsen, Trygve Nilsen, Olav Sigurd Kjesbu. Liver energy, atresia and oocyte stage influence fecundity regulation in Northeast Arctic cod. MARINE ECOLOGY-PROGRESS SERIES 404: 173-183 2010 DOI: 10.3354/meps08486

Abstract: Marine ecosystems are changing; global warming-induced increases in water temperatures and fishing have caused truncated age structures and small sizes at maturity in many stocks. This may affect both populations total reproductive output and the link between population demography and recruitment, yet detailed information on fecundity regulation is generally lacking for marine fishes. We therefore examined associations between liver energy, oocyte stage, leading cohort oocyte size (LC20), atresia and fecundity for the Northeast Arctic cod (NEAC) *Gadus morhua* L. from 2006 to 2008 in a comprehensive field and laboratory study. The relationship between the relative liver size (hepatosomatic index, HSI) and specific liver energy content was best described by an asymptotic curve, increasing rapidly at first, then levelling off at HSI > 6%. LC20 increased towards the spawning season, but was also positively associated with total length. At present there is thus a tendency towards larger NEAC females spawning earlier. The incidence of atresia was highest during the advanced yolk granule stage. Only 1% of females that reached an LC20 > 300 μ m absorbed all oocytes and thereby aborted spawning. Potential fecundity showed a parabolic relationship with LC20, peaking around 614 μ m, i.e. approximately on February 1st, and was positively associated with weight, liver energy and, presently, age. In summary, NEAC females that start vitellogenesis will likely spawn. Atresia and fecundity down-regulation appears only to become pronounced close to spawning. Finally, the size-dependent spawning time, which appears to have emerged in the stock recently, may alter the link between population demography and recruitment.

Audrey J. Geffen: identifying harvested fish to their population of origin

Ruth M. Higgins, Bret S. Danilowicz, Juan A. Balbuena, Anna K. Danielsdottir, **Audrey J. Geffen**, Wim G. Meijer, Johan Modin, Francisco E. Montero, Christophe Pampoulie, Diana Perdiguero-Alonso, Arnd Schreiber, Magnus O. Stefansson, Bryan Wilson. Multi-disciplinary fingerprints reveal the harvest location of cod *Gadus morhua* in the northeast Atlantic. MARINE ECOLOGY-PROGRESS 404: 197-206 2010 DOI: 10.3354/meps08492

Abstract: Using multiple biological markers to establish the fingerprint of a harvest location, individual cod *Gadus morhua* L. can be classified to their population of origin without error. A combined approach to classification using otolith microchemistry, otolith shape analysis, body morphometry, microbial assemblages, internal and external parasites, and microsatellite DNA was found to be more powerful than by any single technique. Binomial and multinomial logistic regression analyses were used to distinguish wild from farmed fish and subsequently to determine the precise harvest origin of each individual. Two new approaches were used: one focusing on optimal or key variables from each discipline and the other using probability values derived on a technique-by-technique basis. Cod from widely separated origins were classified with high (up to 100% correct) placement success. Focusing on the placement of individual fish, this study represents a decisive advance toward identifying fish harvested from protected populations.

Ivar Ronnestad, Koji Murashita, Ann-Elise Jordal, and Cecile Jolly: identifying a useful marker for estimating protein absorption

Ivar Ronnestad, Koji Murashita, Gabor Kottra, Ann-Elise Jordal, Shailesh Narawane, Cecile Jolly, Hannelore Daniel, Tiziano Verri. Molecular Cloning and Functional Expression of Atlantic Salmon Peptide Transporter 1 in *Xenopus* Oocytes Reveals Efficient Intestinal Uptake of Lysine-Containing and Other Bioactive Di- and Tripeptides in Teleost Fish. *JOURNAL OF NUTRITION* 140(5): 893-900 MAY 2010 DOI: 10.3945/jn.109.118240

Abstract: Atlantic salmon (*Salmo salar* L.) is one of the most economically important cultured fish and also a key model species in fish nutrition. During digestion, dietary proteins are enzymatically cleaved and a fraction of degradation products in the form of di- and tripeptides translocates from the intestinal lumen into the enterocyte via the Peptide Transporter 1 (PepT1). With this in mind, a full-length cDNA encoding the Atlantic salmon PepT1 (asPepT1) was cloned and functionally characterized. When overexpressed in *Xenopus laevis* oocytes, asPepT1 operated as a low-affinity/high-capacity transport system, and its maximal transport activity slightly increased as external proton concentration decreased (varying extracellular pH from 6.5 to 8.5). A total of 19 tested di- and tripeptides, some with acknowledged bioactive properties, some containing lysine, which is conditionally growth limiting in fish, were identified as well transported substrates, with affinities ranging between similar to 0.5 and similar to 1.5 mmol/L. Analysis of body tissue distribution showed the highest levels of asPepT1 mRNA in the digestive tract. In particular, asPepT1 mRNA was present in all segments after the stomach, with higher levels in the pyloric caeca and midgut region and lower levels in the hindgut. Depriving salmon of food for 6 d resulted in a similar to 70% reduction of intestinal PepT1 mRNA levels. asPepT1 will allow systematic in vitro analysis of transport of selected di- and tripeptides that may be generated in Atlantic salmon intestine during gastrointestinal transit. Also, asPepT1 will be useful as a marker to estimate protein absorption function along the intestine under various physiological and pathological conditions. *J. Nutr.* 140: 893-900, 2010.

Richard Telford: sea vs land records for Holocene optimum

C. Andersson, F. S. R. Pausata, E. Jansen, B. Risebrobakken, **R. J. Telford.** Holocene trends in the foraminifer record from the Norwegian Sea and the North Atlantic Ocean. *CLIMATE OF THE PAST* 6(2): 179-193 2010

Abstract: The early to mid-Holocene thermal optimum is a well-known feature in a wide variety of paleoclimate archives from the Northern Hemisphere. Reconstructed summer temperature anomalies from across northern Europe show a clear maximum around 6000 years before present (6 ka). For the marine realm, Holocene trends in sea-surface temperature reconstructions for the North Atlantic and Norwegian Sea do not exhibit a consistent pattern of early to mid-Holocene warmth. Sea-surface temperature records based on alkenones and diatoms generally show the existence of a warm early to mid-Holocene optimum. In contrast, several foraminifer and radiolarian based temperature records from the North Atlantic and Norwegian Sea show a cool mid-Holocene anomaly and a trend towards warmer temperatures in the late Holocene. In this paper, we revisit the foraminifer record from the Voring Plateau in the Norwegian Sea. We also compare this record with published foraminifer based temperature reconstructions from the North Atlantic and with modelled (CCSM3) upper ocean temperatures. Model results indicate that while the seasonal summer warming of the sea-surface was stronger during the mid-Holocene, sub-surface depths experienced a cooling. This hydrographic setting can explain the discrepancies between the Holocene trends exhibited by phytoplankton and zooplankton based temperature proxy records.