

**J. Sook Chung**

Associate Professor

Institute of Marine and Environmental Technology

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**Graduate Faculty Appointment:** Marine Estuarine Environmental Sciences (MEES);  
Graduate Faculty: AOS: Marine Environmental Biology/Biotechnology, University  
of Maryland at College Park, 2004-present

**EDUCATION**

- 1991 Ph.D. Department of Entomology, Texas A & M University  
(Supervisor: Professor L. L. Keeley)
- 1981 M. Sc. Department of Zoology, Seoul National University, S. Korea  
(Supervisor: Professor Wan-kyoo, Cho)
- 1979 B.Sc. Pusan National University, S. Korea

**Professional Training**

- 2010 Environmental Genomics, MDIBL, Maine, USA
- 1998 Molecular biology, School of Biological Sciences, Liverpool University, UK
- 1996 Bioinformatics course, Biochemistry Department, Leeds University, UK
- 1994 NMR course, Chemistry Department, Birkbeck College, University of  
London, UK
- 1991-1994: Molecular immunology and protein engineering courses,  
Crystallography Department, Birkbeck College, University of London, UK

**RECENT EMPLOYMENT**

- 2012-present Associate professor, UMCES-IMET, Baltimore, MD
- 2010-2012 Assistant professor, UMCES-IMET, Baltimore, MD
- 2004-2010 Assistant professor, Center of Marine Biotechnology,  
University of Maryland Biotechnology Institute, Baltimore, MD

**RESEARCH: AREAS OF PROFESSIONAL EXPERTISE**

The overarching theme of my research is unraveling the endocrine and neuroendocrine mechanisms regulating the growth, molting, sex differentiation, and reproduction of decapod crustaceans (crabs, shrimps, crayfish, lobsters, etc).

My research particularly focuses on the regulatory system controlling biological processes of molting, before and after ecdysis of the blue crab, sex differentiation and female ovarian development at the cellular, tissue, and organismal levels. Primarily, I aim to localize, identify and characterize the necessary hormones in order to study their

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mode of actions, receptor characterization and signal transduction. The specific research areas are as follows:

- Hormonal regulation of the grow growth and molting
- Hormonal control of sex differentiation, vitellogenesis, ovarian development, spermatogenesis and spawning
- Stress and environmental physiology and endocrinology

## CURRENT PROJECTS

- Understanding chronic impacts of dispersants and dispersed oil on molting, endocrine status and behavior of the blue crab larvae: inputs for recruitment and population models with Drs. E. Schott, A. Hoyes and C. Mitchemore, funded by CRRC
- Functional roles of a novel crustacean female sex hormone in sex differentiation and developing female features of crustaceans, funded by NSF
- Uptake and effects of dispersed oil droplets and emulsified oil by estuarine crustaceans (blue crab and grass shrimp) in the Gulf of Mexico. Co-PI with Drs. D. Lee at SkIO and H. Perry at GCRL, funded by EPA
- Understanding the basic biology of the growth of commercially important cold water crustacean species in S. Korea waters with Drs. D.S. Kim at KIOST, funded by KIOST- International Collaborative Research Grant
- Integrated Study of Coastal Ecosystem Processes and Dynamics in the Mid-Atlantic Region with Dr. J. Pitula at UMES, funded by NSF CREST

## PUBLICATIONS

46. **J. Sook Chung**, H. Katayama and H. Dirksen (2012). New functions of arthropod bursicon in the deposition and thickening of new cuticle and haemocyte granulation in the blue crab, *Callinectes sapidus*. **PLoS ONE**, <http://dx.plos.org/10.1371/journal.pone.0046299>
45. **J. Sook Chung**, L. Maurer, M. Bratcher, J. S. Pitula, and M. B. Ogburn (2012) Cloning of aquaporin-1 of the blue crab, *Callinectes sapidus*: its expression during the larval development in hyposalinity. **Aquatic Biosystems** 8:21
44. Ramachandra Reddy Pamuru, Rivka Manor, **J. Sook Chung**, Nili Zmora, Lilah Glazer, Eliahu D. Aflalo, Simy Weil, Ohad Rosen and Amir Sagi (2012). Stimulation of molt by RNA interference of the molt-inhibiting hormone in the crayfish *Cherax quadricarinatus*. **Gen Comp Endocrinol** 17: 227-236.
43. Tsutsui, N. and **J. Sook Chung** (2012). A novel putative lipoprotein receptor (*CasLpR*) in the hemocytes of the blue crab, *Callinectes sapidus*: cloning and up-regulated expression in the hemocytes after immune challenge. **Fish Shellfish Immunol** 32: 469-475.
42. **J. Sook Chung**, T. R. Bachvaroff, A. Place and T. Trant (2011). A second copper zinc superoxide dismutase (CuZnSOD) in the blue crab *Callinectes sapidus*:

cloning and up-regulated expression in the hemocytes after immune challenge. **Fish Shellfish Immunol** 32: 16-25.

41. **J. Sook Chung**, R. Manor, and A. Sagi (2011) Molecular cloning of the full length cDNA encoding an insulin-like androgenic gland factor (*IAG*) from the androgenic gland of adult male blue crab, *Callinectes sapidus*: an implication eyestalk neuropeptide(s) involvement of *IAG* expression. **Gen Comp Endocrinol** 173: 4-10.
40. H. Piontkivska, **J. Sook Chung**, A. V. Ivanina, E. P. Sokolov, S. Techa, and I. M. Sokolova (2011) Molecular characterization and mRNA expression of two key enzymes of hypoxia-sensing pathways in eastern oysters *Crassostrea virginica* (Gmelin): Hypoxia-inducible factor 1 $\alpha$  (HIF-1 $\alpha$ ) and HIF-prolyl hydroxylase 2 (PHD2). **Comp Biochem Physiol Part D: Genomics and Proteomics** 6: 103-114.
39. K. Costello, **J. S. Chung**, S. Skarke, P. H. Lenz, and C. H. Wilson (2010) Identification of a voltage-gated sodium ion channel gene in the copepods *Calanus finmarchicus*, *Bestiolina similis*, *Undinula vulgaris*, and *Parvocalanus crassirostris*. **MDIBL Bulletin** 37-39.
38. **J. Sook Chung**, N. Zmora, N. Tsutsui, and H. Katayama (2010). Crustacean hyperglycemic hormone (CHH) neuropeptides family: function, titer, and binding to target tissues. **Gen Comp Endocrinol** 166: 447-454.
37. A. V. Ivanina\*, S. Eilers, **J. Sook Chung**, S. Techa, I.O. Kurochkin, H. Piontkivska, E. P. Sokolov, and I. M. Sokolova (2010). Effects of cadmium exposure and intermittent anoxia on nitric oxide metabolism in eastern oysters *Crassostrea virginica*. **J Exp Biol** 213: 433-444.
36. Ziv Roth, Shmuel Parnes, Simy Wiel, Amir Sagi, Nili Zmora, **J. Sook Chung** and Isam Khalaila (2010). The glycan moieties of the crustacean egg yolk protein. Does a glucose cap on a secreted protein make sense? **Glycoconju J** 27: 159-169.
35. **J. Sook Chung** (2010). Hemolymph ecdysteroids during the last three molt cycles of the blue crab, *Callinectes sapidus*: quantitative and qualitative analyses and regulation. **Arch Insect Biochem Physiol** 73: 1-13.
34. N. Zmora, J. T. Trant, Y. Zohar, and **J. Sook Chung** (2009). Molt-inhibiting hormone stimulates vitellogenesis at the advanced ovarian development in the blue crab, *Callinectes sapidus* 1: an ovarian stage dependent involvement. **Saline Systems** 5: 7.
33. N. Zmora, A. Sagi, Y. Zohar, and **J. Sook Chung** (2009). Molt-inhibiting hormone stimulates vitellogenesis at the advanced ovarian development in the blue crab, *Callinectes sapidus* 2: novel specific binding sites in hepatopancreas and cAMP as a second messenger. **Saline Systems** 5: 6.
32. **J. Sook Chung**, S. Bembe, S. Tamone, E. Andrews, and H. Thomas (2009). Molecular cloning of the crustacean hyperglycemic hormone (CHH) from the X-organ and identification of the neuropeptide in the sinus glands of the Alaskan Tanner crab, *Chionoecetes bairdi*. **Gen Comp Endocrinol** 162: 129-133.
31. H. Katayama and **J. Sook Chung** (2009). The specific binding sites of eyestalk- and pericardial organ-crustacean hyperglycaemic hormones (CHHs) in multiple

- tissues of the blue crab, *Callinectes sapidus*. **J Exp Biol** 312: 542-549. (IF: 3.04; 7)
30. **J. Sook Chung** (2008). A trehalose 6-phosphate synthase gene of the hemocytes of the blue crab, *Callinectes sapidus*: the molecular structure, the expression, its enzyme activity and relationship to hemolymph trehalose levels. **Saline Systems** 4: 18.
29. **J. Sook Chung** and S.G. Webster (2008). Angiotensin-converting enzyme (ACE) like activity in crab gills and its putative role in degradation of crustacean hyperglycemic hormone (CHH). **Arch Insect Biochem Physiol** 68: 171-180.
28. **J. Sook Chung** and N. Zmora (2008). Functional studies of crustacean hyperglycemic hormones (CHHs) of the blue crab, *Callinectes sapidus*: the expression and release of CHH in eyestalk and pericardial organ in response to environmental stress. **FEBS J** 275: 693-704.
27. Y. Zohar, A. H. Hines, O. Zmora, E. G. Johnson, R.N. Lipcius, R. D. Seitz, D. B. Eggleston, A. R. Place, E. Schott, J. Stubblefield and **J. Sook Chung** (2008). The Chesapeake Bay blue crab (*Callinectes sapidus*): A multidisciplinary approach to responsible stock enhancement. **Rev Fish Sci** 16, 1-11.
26. A. L. Drexler, C.C. Harris, M. G. Dela Pena, M. Asuncion-Uchi, **J. S. Chung**, S. Webster, and M. Fuse (2007). Molecular characterization and cell-specific expression of an ion transport peptide in the tobacco hornworm, *Manduca sexta*. **Cell Tissue Res** 329: 391-408.
25. N. Zmora, J. Trant J, S. M. Chen and **J. Sook Chung** (2007). Vitellogenin and its Messenger RNA during ovarian development in the female blue crab, *Callinectes sapidus*: gene expression, synthesis, transport, and cleavage. **Biol Reprod** 77: 138-146.
24. **J. Sook Chung\***, D.C. Wilcockson, N. Zmora, Y. Zohar, H. Dirksen, and S.G. Webster (2006). Identification and developmental expression of mRNAs encoding crustacean cardioactive peptide (CCAP) in decapod crustaceans. **J Exp Biol** 209: 3862-3872.
23. Y.W. Hsu, D.I. Messinger, **J. Sook Chung**, S. G. Webster, H. O. de la Iglesia, and A. E. Christie (2006). Members of the crustacean hyperglycemic hormone (CHH) peptide family are differentially distributed both between and within the neuroendocrine organs of *Cancer* crabs: implications for differential release and pleiotropic function. **J Exp Biol** 209: 3241-3256.
22. **J. Sook Chung\*** and S. G. Webster (2006). Binding sites of crustacean hyperglycaemic hormone and its second messengers on gills and hindgut of the green shore crab, *Carcinus maenas*. **Gen Comp Endocrinol** 147: 206-213.
21. **J. Sook Chung** and S. G. Webster (2005). Dynamics of *in vivo* release of molt-inhibiting hormone (MIH) and crustacean hyperglycemic hormone (CHH) in the shore crab, *Carcinus maenas*. **Endocrinology** 146: 5545-5551.
20. **J. Sook Chung** and S. G. Webster (2004). Expression and release patterns of neuropeptides during embryonic development and hatching of the green shore crab, *Carcinus maenas*. **Development** 131: 4751-4761.
19. **J. Sook Chung** and S. G. Webster (2003). Molt cycle-related changes in biological activity of molt-inhibiting hormone (MIH) and crustacean hyperglycaemic

- hormone (CHH) in the crab, *Carcinus maenas*: From target to transcript. **Eur J Biochem** 270: 3280-3288.
18. D. C. Wilcokson, **J. Sook Chung** and S. G. Webster (2002). Is crustacean hyperglycaemic hormone precursor-related peptide a circulating neurohormone in crabs? **Cell Tissue Res** 307: 129-138.
17. H. Dircksen, D. Bocking, U. Heyn, C. Mandel, **J. S. Chung**, G. Baggerman, P. Verhaert, S. Daufeldt, T. Plosch, P. P. Jaros, E. Eaelkens, R. Keller and S. G. Webster (2001). Crustacean hyperglycaemic hormone (CHH)-like peptides and CHH-precursor-related peptides from pericardial organ neurosecretory cells in the shore crab, *Carcinus maenas*, are putatively spliced and modified products of multiple genes. **Biochem J** 356: 159-170.
16. S. G. Webster, H. Dircksen and **J. S. Chung** (2000). Endocrine cells in the gut of the shore crab, *Carcinus maenas*, immunoreactive to crustacean hyperglycemic hormone and its precursor-related peptide. **Cell Tissue Res** 300: 193-205.
15. M. K. Phlippen, S. G. Webster, **J. S. Chung** and H. Dircksen (2000). Ecdysis of decapod crustaceans is associated with dramatic release of crustacean cardioactive peptide into the haemolymph. **J Exp Biol** 203: 521-536.
14. **J. S. Chung**, H. Dircksen, and S. G. Webster (1999). A remarkable, precisely timed release of hyperglycemic hormone from endocrine cells in the gut is associated with ecdysis in the crab *Carcinus maenas*. **Proc Natl Acad Sci USA**, 96: 13103-13107.
13. **J. S. Chung**, M.C. Wilkinson, and S.G. Webster (1998). Amino acid sequences of both isoforms of crustacean hyperglycaemic hormones (CHH) and corresponding precursor-related peptide in *Cancer pagurus*: The complete inventory of CHH family neuropeptides now identified in a crab. **Reg Peptides** 77: 17-24.
12. **J. S. Chung** and S.G. Webster (1996). Does the N-terminal pyroglutamate residue have any physiological significance for crab hyperglycaemic neuropeptides? **Eur J Biochem** 240: 358-364.
11. G. Wainwright, S.G. Webster, M. C. Wilkinson, **J. S. Chung** and H. H. Rees (1996) Structure and function of mandibular organ-inhibiting hormone (MOIH) in the crab, *Cancer pagurus*; evidence for complex control of growth and reproduction. **J Biol Chem** 271: 12749-12754.
10. **J. S. Chung**, M. C. Wilkinson and S. G. Webster (1996) Determination of the amino acid sequence of the moult-inhibiting hormone (MIH) from the edible crab, *Cancer pagurus*. **Neuropeptides** 30: 95-101.

#### **Insect research published in Peer-reviewed scientific journals**

9. G. J. Goldsworthy, **J. Sook Chung**, M. S. J. Simmonds, M. Tatari, S. Varouni and C.P. Poulos. (2003) The synthesis of an analogue of the locust CRF-like diuretic peptide, and the biological activities of this and some C-terminal fragments. **Peptides** 24: 1607-1613.
8. C.A. Roberts, R.J. Nachman, G. M. Coast, **J. S. Chung**, G. M. Holman, M. Hariharan and J.A. Tainer (1997). Consensus chemistry and  $\beta$ -turn conformation of the

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- active core of the myotropic/diuretic insect kinin neuropeptide family. **Chemistry and Biology** 4: 105-117.
7. **J. S. Chung**, C. H. Wheeler, G. J. Goldsworthy and G. M. Coast (1995). Properties of achetakinin binding sites on Malpighian tubule membranes from the house cricket, *Acheta domesticus*. **Peptides** 16: 375-382.
  6. F. L. Clottens, G. M. Holman, G. M. Coast, N. F. Totty, T. K. Hayes, I. Kay, A. I. Mallet, M. S. Wright, **J. S. Chung**, O. Truong and D. L. Bull (1994). Isolation and characterisation of a diuretic peptide common to the house fly and stable fly. **Peptides** 15: 971-979.
  5. **J. S. Chung**, G. J. Goldsworthy and G. M. Coast (1994). Haemolymph and tissue titres of achetakinins in the house cricket, *Acheta domesticus*: effect of starvation and dehydration. **J Exp Biol** 193: 307-319.
  4. M. Patel, **J. S. Chung**, I. Kay, A. I. Mallet, C. R. Gibbon, K. S. J. Thompson, J. P. Bacon and G. M. Coast (1994). Localisation of *Locusta*-DP in locust CNS and haemolymph satisfies initial hormonal criteria. **Peptides** 15: 591-602.
  3. L. L. Keeley, **J. S. Chung** and T. K. Hayes (1992). Diuretic and antifeedant actions by *Manduca sexta* diuretic hormone in lepidopteran larvae. **Cellular and Molecular Life Sciences**, 48: 1145-1148.
  2. G. M. Coast, I. Kay, T. K. Hayes and **J. S. Chung** (1992). Effect of *Manduca sexta* diuretic hormone and related peptides on isolated Malpighian tubules of the house cricket, *Acheta domesticus*. **J Exp Biol** 162: 331-338.
  1. **J. S. Chung** and L. L. Keeley (1989). Evidence and bioassay for diuretic factors in the tobacco budworm, *Heliothis virescens* (F.). **J Comp Physiol** B 159: 359-370.

#### CONFERENCE PROCEEDINGS AND BOOK CHAPTER

1. S.G. Webster and **J. S. Chung** (1999). Roles of moult-inhibiting hormone and crustacean hyperglycemic hormone in controlling moulting in Decapod Crustaceans. In: Recent Developments in Comparative Endocrinology and Neurobiology (Eds Roubos, E.W., Bonga, S.E.W., Vaudry, H. and De Loof A.), pp.213-216, Shaker, Maastricht.
2. G. M. Coast, **J. S. Chung**, G. J. Goldsworthy, M. Patel, T. K. Hayes and I. Kay (1994). Corticotropin releasing factor related diuretic peptides in insects. In: Perspectives in Comparative Endocrinology, pp 67-73. National Research Council of Canada
3. **J. S. Chung**, C. H. Wheeler, G. J. Goldsworthy and G. M. Coast (1994). Preliminary characterisation of achetakinin-binding sites on cricket Malpighian tubule plasma membrane, ICINN 93: In Insect Neurochemistry and Neurophysiology (Eds, Borkovec, A. B. and Loeb, M. J.) pp. 359-362. CRC Press, London
4. L.L. Keeley, T. K. Hayes, J. Y. Bradfield and **J. S. Chung** (1988). Neuropeptides in insect control. Proceedings, biotechnology, biological pesticides and novel plant-pest resistance for insect pest management, Boyce Thompson Institute for Plant Research, Cornell University

### TEACHING

- Comparative and Molecular Endocrinology MEES 698E (3 credits): odd year  
Spring:
- Co-teaching MEES 608O seminar course (2 credits) with Dr. J. Du: Spring and  
Fall semester:

### CURRENT LAB-MEMBERS

- In Sook Ahn Ph. D: Dec. 2012-
- Sirinart Techa, Ph. D student, MEES, UMCP, 2008 Jan. – present (supported by  
Thai Royal Fellowship)
- Javier Alvarez Zepeda, Ph. D student, MEES, UMCP, 2010 Sept-(supported by  
Fulbright Fellowship)
- Leah Maurer, Dept. of Environmental Science, UMBC undergraduate (2011-)
- Visiting Scientist: Chiara Manfrin, Dept. of Life Sciences - University of Trieste,  
Italy

### PAST LAB-MEMBERS, SUMMER INTERN STUDENTS AND TEACHERS

#### Graduate students and Post-docs:

- Nilli Zmora, Ph. D, 2004 June- 2008 Nov. the Life Sciences Department, Ben-  
Gurion University, Israel (Currently working as a Post-Doc in Dr. Yoni Zohar's lab  
at UMBC)
- Sarah Bembe, MS, Marine Estuarine Environmental Sciences (MEES) program,  
University of Maryland College Park (UMCP), 2006 Aug. –2009 May (Currently  
working in FDA).
- W. Thongda, MS, Marine Estuarine Environmental Sciences (MEES) program,  
University of Maryland College Park (UMCP), 2007 July. –2012 Aug.
- S. Techa, MS Marine Estuarine Environmental Sciences (MEES) program,  
University of Maryland College Park (UMCP), 2008 Jan. –2012 Aug.
- Holly Bowers Ph. D: working in Monterey Bay Aquarium Research Institute
- T. Michelle Blickley, Ph. D: working in NIST
- Q. Shi, Ph. D: Senior Investigator working in Shenzhen Key Lab of Marine  
Genomics, BGI, Shenzhen, China
- Naoaki Tsutsui, Ph. D., postdoctoral fellow (2005-2007): Supported by Blue crab  
grant but awarded a domestic fellowship from the Japanese Promotion of

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Science (JSPS) : the Department of Applied Biological Chemistry, Graduate School of Agricultural and Life Sciences, The University of Tokyo, Japan

- Hide Katayama, Ph.D., postdoctoral fellow (supported by Japanese Promotion of Sciences 2006): Assistant Professor in Department of Applied Biochemistry, School of Engineering, Tokai University, 4-1-1 Kitakaname, Hiratsuka, Kanagawa 259-1292, Japan

#### **Summer Interns:**

- Justin Tibbles, Johns Hopkins University (2006-2009)
- Erin Flynn (2009) Columbia University at, IDeA Network of Biomedical Research Excellence (INBRE) at Mount Desert Island Biological Laboratory, Maine

#### **Minority students supported by Living Marine Resources Cooperative Science Center (LMRCSC), MACRC U STAR and UMES-MBRS-RISE program**

- A. Rafiyat Adeyiga, Chaney University (2012)
- Meagan M. Bratcher\*\*, UMES (2011)
- Anna Katenta\*, University of Maryland Eastern Shore (2010)
- Eric Water, Jr. Virginia Wesleyan College (2010)
- Zianab Sankoh, Morgan State University (2010)
- Charleigh Perry, Hampton University (2008)
- Agnes Omozusi Okhuereigbe\*, UMES (2007)
- Ebony Andrews, Coppin State University (2006)
- Heidi Thomas, Coppin State University (2006)
- Jelani Clement, Hampton University (2004)

#### **High School Interns**

- Jeremy Carton (2012 Sept- 2013 April): Atholton High School, Columbia
- Eric Walker Jr (2009 Sept- 2010 April): Baltimore Polytechnic Institute, Baltimore, MD
- Kara Koler (2009 Sept- 2010 April) Long Reach High School, Columbia, MD
- Gideon S. Wolf (2009) Beth Tfiloh Dahan Community Day School, Baltimore, MD
- Tiaira Wells (2006) Dunbar High School, Baltimore City, MD
- Schedeen Rodgers (2006) Dunbar High School, Baltimore City, MD
- 

#### **Science Teachers (supported by Sea Grant and ExPERT programs)**

- Renee Thompson (2011) Bowie High School, Bowie, MD
- Brittney Shaw (2010) Northeast Evening High School, Pasadena, MD
- Aileen Tan (2008) Winston Middle School, Baltimore city, MD
- Jennifer Petering (2006, 2007) Col. Zadok Magruder High School, MCPS, MD
- Steve Shifflett (2007) Walter Johnson High School, MCPS, MD
- Brad Harrison (2006) Western School of Environmental Science and Technology, BCPS
- Jean Scott (2005) St. Bernadine Catholic School, Baltimore