

CHEMICAL HERITAGE FOUNDATION

**ANN MARIE CRAIG**

The Pew Scholars Program in the Biomedical Sciences

Transcript of an Interview  
Conducted by

Andrea R. Maestrejuan

at

Washington University School of Medicine  
St. Louis, Missouri

on

8-10 April 2003

From the Original Collection of the University of California, Los Angeles

## ACKNOWLEDGEMENT

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## ANN MARIE CRAIG

1961 Born in Ithaca, New York on 4 June

### Education

1984 B.Sc., Biochemistry, Carleton University

1989 Ph.D., Biochemistry, University of Western Ontario

### Professional Experience

1989-1991 National Institute of Neurological Disorders and Stroke,  
National Institutes of Health  
Postdoctoral Fellow, Lab of Molecular and  
Cellular Neurobiology

1991-1994 University of Virginia, Charlottesville  
Postdoctoral Fellow, Department of Neuroscience

1994-1999 University of Illinois, Urbana  
Assistant Professor, Department of Cell and Structural Biology,  
and Neuroscience Program

1999-2005 Washington University School of Medicine  
Associate Professor, Department of Anatomy and Neurobiology

2005-present University of British Columbia  
Professor, Department of Psychiatry and Brain Research Centre

### Honors

1984 Director's Award in Biochemistry and Chancellor's Medal,  
Carleton University

1985-1989 Medical Research Council of Canada Studentship

1989-1992 Medical Research Council of Canada Fellowship

1992-1994 NIH Individual NRSA Fellowship

1994-2006 NIH RO1 Award: Subcellular Targeting of Neurotransmitter Receptors

1997-2001 Pew Scholars Award in the Biomedical Sciences

1999-2004 NIH RO1 Award: Molecular Analysis of Neuronal Polarization

2000-2005	NIH P01 Award: Molecular Genetics of Mammalian Synaptogenesis (PI: Sanes)
2005-2010	NIH R01 Award: Mechanisms of Central Neuron Synaptogenesis
2005-2010	CIHR Operating Grant: Molecular Dynamics at the Postsynaptic Density
2005	Michael Smith Foundation Senior Scholar Award
2005	Canada Research Chair in Neurobiology, Tier 1

### Selected Publications

- Clouthier DJ., Craig AM and Ramsay DA: High resolution absorption and magnetic rotation studies of the  $A_2 - X^1A_1$  system of formaldehyde- $d_4$ . Can. J. Physics 1983; 61:1073-1081.
- Guelachvili G, Craig AM and Ramsay DA: High-resolution Fourier studies of diacetylene in the regions of the  $\nu_4$  and  $\nu_5$  fundamentals. J. Mol. Spectrosc. 1984; 105:156-192.
- Clouthier DJ, Craig AM and Birss FW: A vibrational and rotational analysis of the  $a^3A-X^1A$  band system of HDCO. Can. J. Physics 1984; 62:973-977.
- Craig AM, Nemir M, Mukherjee BB, Chambers AF and Denhardt DT: Identification of the major phosphoprotein secreted by many rodent cell lines as *2ar*/osteopontin: enhanced expression in H-ras-transformed 3T3 cells. Biochem. Biophys. Res. Commun. 1988; 157:166-173.
- Denhardt DT, Craig AM and Smith JH: 1989. Regulation of gene expression by the tumor promoter 12-O-tetradecanoylphorbol-13-acetate. In: Genes and Signal Transduction in Multistage Carcinogenesis (N.H. Colburn, ed.), Marcel Dekker, New York, pp. 167-189.
- Craig AM, Smith JH and Denhardt DT: Osteopontin, a transformation-associated cell adhesion phosphoprotein, is induced by 12-O-tetradecanoylphorbol-13-acetate in mouse epidermis. J. Biol. Chem. 1989; 264:9682-9689.
- Noda M, Vogel RL, Craig AM, Prah J, DeLuca HF and Denhardt DT: Identification of a DNA sequence responsible for binding of the 1,25-dihydroxyvitamin D<sub>3</sub> receptor and 1,25-dihydroxyvitamin D<sub>3</sub> enhancement of mouse secreted phosphoprotein 1 (*Spp-1*, or osteopontin) gene expression. Proc. Natl. Acad. Sci. USA 1990; 87:9995-9999.
- Craig AM, Bowden GT, Chambers AF, Spearman MA, Greenberg AH, Wright JA, McLeod M and Denhardt DT: Secreted phosphoprotein mRNA is induced during multi-stage carcinogenesis in mouse skin and correlates with the metastatic potential of murine fibroblasts. Int. J. Cancer 1990; 46:133-137.
- Somerman MJ, Schroff B, Agraves WS, Morrison G, Craig AM and Denhardt DT: Expression of attachment proteins during cementogenesis. J. Biol. Buccale 1990; 18:207-214.
- Guo X, Chambers AF, Parfett Cll, Waterhouse P, Murphy LC, Reid RE, Craig AM, Edwards DR and Denhardt DT: Identification of a serum-inducible mRNA (5B 10) as the mouse homolog of calcyclin: tissue distribution and expression in metastatic, rastransformed NIH 3T3 cells. Cell Growth & Differentiation 1990; 1:330-338.
- Craig AM and Denhardt DT: The murine gene encoding secreted phosphoprotein 1 (osteopontin): promoter structure, activity, and induction in vivo by estrogen and progesterone. Gene 1991; 100:163-171.
- Scharenberg AM, Olds JL, Schreurs BG, Craig AM and Alkon DL: Protein kinase C redistribution within CA3 stratum oriens during acquisition of nictitating membrane



- conditioning in the rabbit. *Proc. Natl. Acad. Sci. USA* 1991; 88:6637-6641.
- Craig AM, Jareb M and Banker G: 1992. Neuronal polarity. *Curr. Opin. Neurobiol.* 2:602-606.
- Craig AM, Olds JL, Schreurs BG, Scharenberg AM and Alkon DL: Quantitative distribution of protein kinase C  $\alpha$ ,  $\beta$ ,  $\gamma$ , and  $\epsilon$  mRNAs in the hippocampus of control and nictitating membrane conditioned rabbits. *Mol. Brain Res.* 1993; 19:269-276.
- Craig AM, Blackstone CL, Hugarir RL and Banker G: The distribution of glutamate receptors in cultured rat hippocampal neurons: Postsynaptic clustering of AMPA-selective subunits. *Neuron* 1993; 10:1055-1068.
- Behrend EI, Craig AM, Wilson SM, Denhardt DT and Chambers AF: Reduced malignancy of Ras-transformed NIH 3T3 cells expressing antisense osteopontin RNA. *Cancer Research* 1994; 54:832-837.
- Craig AM, Blackstone CD, Hugarir RL and Banker G: Selective clustering of glutamate and  $\gamma$ -aminobutyric acid receptors opposite terminals releasing the corresponding neurotransmitters. *Proc. Natl. Acad. Sci. USA* 1994; 91:12373-12377.
- Craig AM and Banker G: 1994. Neuronal polarity. *Annu. Rev. Neurosci.* 17:267-310.
- Nairn AC, Sihra TS, Andjus P, Craig AM, Miyawaki A, Kloppenburg P, Lin Z and Pouzat C: Rapid purification of protein phosphatase-2B (calcineurin) from rat forebrain. *Neuroprotocols* 1995; 6:105-107.
- Craig AM, Wyborski RJ and Banker G: Preferential addition of newly synthesized membrane protein at axonal growth cones. *Nature* 1995; 375:592-594.
- Craig AM, Banker G, Chang W, McGrath ME and Serpinskaya AS: Clustering of gephyrin at GABAergic but not glutamatergic synapses in cultured rat hippocampal neurons. *J. Neurosci.* 1996; 16:3166-3177.
- Wyszynski M, Lin J, Rao A, Nigh E, Beggs AH, Craig AM and Sheng M: Competitive binding of  $\alpha$ -actinin and calmodulin to the NMDA receptor. *Nature* 1997; 385:439-442.
- Kim E, Naisbitt S, Hsueh YP, Rao A, Rothschild A, Craig AM and Sheng M: GKAP, a novel synaptic protein that interacts with the guanylate kinase-like domain of the PSD-95/SAP90 family of channel clustering molecules. *J. Cell Biol.* 1997; 136:669-678.
- Naisbitt S, Kim E, Weinberg RJ, Rao A, Yang FC, Craig AM and Sheng M: Characterization of guanylate kinase-associated protein, a postsynaptic density protein at excitatory synapses that interacts directly with postsynaptic density-95/synapse-associated protein 90. *J. Neurosci.* 1997; 17:5687-5696.
- Rao A. and Craig AM: Activity regulates the synaptic localization of the NMDA receptor in hippocampal neurons. *Neuron* 1997; 19:801-812.
- Craig AM: 1998 Transfecting cultured neurons. In: *Culturing Nerve Cells*, 2nd Ed. (G. Banker and K. Goslin, eds.) MIT Press, Cambridge, pp. 79-112.
- Rao A, Kim E, Sheng M and Craig AM: Heterogeneity in the molecular composition of excitatory postsynaptic sites during development of hippocampal neurons in culture. *J. Neurosci.* 1998; 18:1217-1229.
- Wyszynski M, Kharazia V, Shangvi R, Rao A, Beggs AH, Craig AM, Weinberg R and Sheng M: Differential regional expression and ultrastructural localization of  $\alpha$ -actinin-2, a putative NMDA receptor anchoring protein, in rat brain. *J. Neurosci.* 1998; 18:1383-1392.
- Allison DW, Spector I, Gelfand VI and Craig AM: Role of actin in anchoring postsynaptic receptors in cultured hippocampal neurons: Differential attachment of NMDA versus AMPA receptors. *J. Neurosci.* 1998; 18:2423-2436.

- Niethammer M, Valtschanoff JG, Kapoor TM, Allison DW, Weinberg RJ, Craig AM, Schreiber SL and Sheng M: CRIPT, a novel postsynaptic PDZ3-binding protein that links PSD-95 to tubulin. *Neuron* 1998; 20:693-707.
- Gomperts SN, Rao A, Craig AM, Malenka RC and Nicoll RA: Postsynaptically silent synapses in single neuron cultures. *Neuron* 1998; 21:1443-1451.
- Craig AM: 1998. Activity and synaptic receptor targeting: the long view. *Neuron* 21:459-462.
- Serpinskaya AS, Feng G, Sanes JR and Craig AM: Synapse formation by hippocampal neurons from agrin-deficient mice. *Dev. Biol.* 1999; 205:65-78.
- Fong D and Craig AM: The Nam hypothesis? *Neuron* 1999; 23:195-197.
- Crump FT, Fremeau RT and Craig AM: Localization of the brain-specific high affinity L-proline transporter in cultured hippocampal neurons: Molecular heterogeneity of synaptic terminals. *Mol. Cell. Neurosci.* 1999; 13:25-39.
- Stowell JN and Craig AM: Axon / dendrite targeting of metabotropic glutamate receptors by their cytoplasmic carboxy terminal domains. *Neuron* 1999; 22:525-536.
- Rao A, Harms KJ and Craig AM: 2000. Neuroligation: building synapses around the neuroligin-neuroxin link. *Nature Neurosci.* 3:747-749.
- Rao A and Craig AM: 2000. Signaling between the actin cytoskeleton and the postsynaptic density of dendritic spines. *Hippocampus*, 10:527-41.
- Naisbitt SJ, Valtschanoff DW, Sala AC, Kim E, Craig AM, Weinberg RJ, and Sheng M: Interaction of the postsynaptic density-95/guanylate kinase domain-associated protein complex with a light chain of myosin-V and dynein. *J. Neurosci.* 2000; 20:4524-4534.
- Allison DW, Chervin AS, Gelfand VI and Craig AM: Postsynaptic scaffolds of excitatory and inhibitory synapses in hippocampal neurons: maintenance of core components independent of actin filaments and microtubules. *J. Neurosci.*, 2000; 20:4545-4554.
- Rao A, Cha EM and Craig AM: Mismatched appositions of presynaptic and postsynaptic elements in isolated hippocampal neurons. *J. Neurosci.*, 2000; 20:8344-53.
- Boudin H, Doan A, Xia J, Shigemoto R, Huganir RL, Worley P, and Craig AM: Presynaptic clustering of mGluR7a requires the PICK1 PDZ domain binding site. *Neuron*, 2000; 28:485-97.
- Craig AM and Lichtman JW: 2001. Getting a bead on receptor movements. *Nat. Neurosci.*, 4:219-20.
- Craig AM and Lichtman JW: 2001. Synapse formation and maturation. In: *Synapses* (W.M. Cowan T. Sudhof, and C.F. Stevens, eds.) HHMI and Johns Hopkins University Press, pp. 572-612.
- Craig AM and Boudin H. 2001. Molecular heterogeneity of central synapses: afferent and target regulation. *Nat. Neurosci.*, 4:569-78.
- Crump FT, Dillman KS, Craig AM: cAMP-dependent protein kinase mediates activity-regulated synaptic targeting of NMDA receptors. *J. Neurosci.* 2001; 21:5079-88.
- Boudin H, Craig AM: Molecular determinants for PICK1 synaptic aggregation and mGluR7a receptor coclustering: role of the PDZ, coiled-coil, and acidic domains. *J. Biol. Chem.* 2001; 276:3-270-30276.
- Fong DK, Rao A, Crump FT, Craig AM: Rapid synaptic remodeling by protein kinase C: reciprocal translocation of NMDA receptors and calcium/calmodulin-dependent kinase II. *J. Neurosci.* 2002; 22:2153-64.
- Levi S, Grady RM, Henry MD, Campbell KP, Sanes JR, Craig AM: Dystroglycan is selectively

- associated with inhibitory GABAergic synapses but is dispensable for their differentiation. *J Neurosci.* 2002; 22:4274-85.
- Wang X, Weiner JA, Levi S, Craig AM, Bradley A, Sanes JR: 2002. Gamma protocadherins are required for survival of spinal interneurons. *Neuron* 36:843-54.
- Levi S, Logan SM, Tovar KR, Craig AM: 2004. Gephyrin is critical for glycine receptor clustering but not for the formation of functional GABAergic synapses in hippocampal neurons. *J. Neurosci.* 24:207-217.
- Schlieff ML, Craig AM, Gitlin JD. 2004: NMDA receptor activation mediates copper homeostasis in hippocampal neurons. *J Neurosci.* 25:239-246.
- Graf E, Zhang X, Jin SX, Linhoff M, Craig AM: 2004. Neurexins induce differentiation of GABA and glutamate postsynaptic specializations via neuroligins. *Cell*, 119:1013-1026.
- Waites CL, Craig AM, Garner CC: 2004. Mechanisms of vertebrate synaptogenesis. *Annual Reviews Neurosci.*, in press.
- Harms KJ, Craig AM. 2005. Synapse composition and organization following chronic activity blockade in cultured hippocampal neurons. *J Comp Neurol.*, in press.

## ABSTRACT

**Ann Marie Craig** was born in Ithaca, New York, the second of three children. Her father was a graduate student in business administration at Cornell University, and her mother was a nurse. Both parents came from small towns in the Maritime Provinces of Canada, so when Ann Marie was about three years old the family moved back to Canada, where her father became a professor of business administration at Ottawa University. Ann Marie remembers liking school, particularly her third-grade teacher and a high school science teacher, but she does not claim a from-birth interest in science; that came later, after a flirtation with becoming a teacher or a nun.

By the time she entered Queens College as a double major in mathematics and physics, she did know she loved the beauty of internal logic and consistency, which she found most in science. After her first year at Queens she realized that she was in the wrong field, so she began classes in psychology, interested in discovering how the brain works. Next she entered Carleton University with a major in biological psychology, which she soon switched to biochemistry. She spent two of her college summers working for the National Research Council of Canada and one purifying proteins at the University of Western Canada in Ontario. From those summers she gleaned three publications. Her work was mostly molecular neurobiology, cloning DNA, leading her into cancer research.

At the time the Canadian university system did not have rotations; students were expected to find themselves a lab. Ann Marie chose David Denhardt's lab at the University of Western Ontario because she wanted to learn DNA cloning and molecular biology and transfection of mammal cells. She did her Ph.D. research on molecular biology of cancer progression and the 2ar/osteopontin protein.

After what Craig considers an unusually smooth graduate training, she revived her interest in the molecular basis of learning and memory and accepted a postdoc in Daniel Alkon's lab at the National Institute of Neurological Disorders and Stroke at the National Institutes of Health. Disappointed in the progress of her research, she left Alkon's lab for a postdoc at Gary Banker's lab at the University of Virginia, changing also her research model organism, working on neuronal polarity and the clustering and trafficking of receptors in neurons.

Ann Marie began learning molecular biology as an important technique in neuroscience, but recognizing that electrophysiology was key, Craig almost decided to do a third postdoc to learn electrophysiology; instead she decided to accept a position at the University of Illinois and to set up her own lab. Again her interest shifted, this time to synapses, and Washington University in St. Louis offered more scope for pursuing that research, so she accepted an associate professorship there. Her research interests continue to include the molecular mechanisms underlying synapse formation and synaptic plasticity, their regulation and functional importance; she hopes in the future to initiate research on central neuron synapse assembly, modulation, and electrophysiology.

## UCLA INTERVIEW HISTORY

### INTERVIEWER:

Andrea R. Maestrejuan, Interviewer, UCLA Oral History Program; B.S., Biological Sciences, University of California, Irvine, 1986; M.A., History, University of California, Riverside, 1991; C.Phil., History, University of California, Los Angeles, 2000.

### TIME AND SETTING OF INTERVIEW:

**Place:** Craig's office at Washington University School of Medicine.

**Dates of sessions:** April 8, 2003; April 9, 2003; April 10, 2003

**Total number of recorded hours:** 4.0

**Persons present during interview:** Craig and Maestrejuan.

### CONDUCT OF INTERVIEW:

This interview is one in a series with Pew Scholars in the Biomedical Sciences conducted by the UCLA Oral History Program in conjunction with the Pew Charitable Trusts' Pew Scholars in the Biomedical Sciences Oral History and Archives Project. The project has been designed to document the backgrounds, education, and research of biomedical scientists awarded four-year Pew scholarships since 1988.

To provide an overall framework for project interviews, the director of the UCLA Oral History Program and three UCLA faculty project consultants developed a topic outline. In preparing for this interview, Maestrejuan held a telephone preinterview conversation with Craig to obtain written background information (curriculum vitae, copies of published articles, etc.) and agree on an interviewing schedule. She also reviewed documentation in Craig's file at the Pew Scholars Program office in San Francisco, including Craig's proposal application, letters of recommendation, and reviews by Pew Scholars Program national advisory committee members.

### ORIGINAL EDITING:

Carol Squires edited the interview. She checked the verbatim transcript of the interview against the original tape recordings, edited for punctuation, paragraphing, and spelling, and verified proper names. Words and phrases inserted by the editor have been bracketed.

Craig did not review the transcript. Consequently, some proper names and other information remain unverified.

Carol Squires prepared the table of contents and compiled the guide to proper names.

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