THE UNIVERSITY OF BRITISH COLUMBIA

Curriculum Vitae for Faculty Members

Date: August 2008 **Initials**:

SURNAME: GASS **FIRST NAME**: Clifton
MIDDLE NAME(S): Lee

DEPARTMENT/SCHOOL: **Zoology**

FACULTY: Science

PRESENT RANK: Professor Emeritus **SINCE**: March 2004

POST-SECONDARY EDUCATION

University or Institution	Degree	Subject Area	Dates
Chico State College	A.B.	Biology	60-64
Chico State College	M.A.	Biology	64-67
University of Oregon	M.Sc.	Biology	68-69
University of Oregon	Ph.D.	Biology	69-74

Professional Associations

1986-87 - President, Sculptors' Society of British Columbia
Animal Behaviour Society
Behavioural Ecology Society
Society for Ecological Psychology

EMPLOYMENT RECORD

Prior to coming to UBC

University, Company or Organization	Rank or Title	Dates
Chico State College, Chico, Calif.	Half-time teaching faculty, Biology	64-66
Ygnacio Valley High School, Concord, Calif.	Biology Teacher	66-68
Alameda High School, Calif.	Taught summer field studies course, marine ecol.	67
Univ. of Oregon, Eugene; Institute in	Instructor, Biology; Assistant Director, NSF	69-71

Biology	Academic Year	
Univ. of Oregon, Eugene	Instructor, Biology (Summer)	70-74
Univ. of Oregon	Graduate Teaching Fellow	71-74
Lane Community College, Eugene, Oregon	Part-time instructor, core biology program (Spring)	73

At UBC

Rank or Title	Dates
Assistant Professor	1974-83
Associate Professor	1983-2000
Professor	2000-2004
Professor Emeritus	2004-present
Educational Services Contract	2004-2006

Date of granting of tenure at U.B.C.: July 1979

LEAVES OF ABSENCE

University, Company or Organizationat which Leave was taken	Type of Leave	Dates
UBC & Queen's University	Sabbatical - 75% salary	July 81-July 82
University of Maryland, Baltimore County	Sabbatical - 75% salary	Oct. 97
National University of Singapore & UBC	Sabbatical - 75% salary	July 97-July 98

TEACHING

My primary academic interest is in transforming how undergraduate science education is conducted by students and professors; particularly in building true communities of scholars. I was active in this area before coming to UBC and have continued to develop and share innovative approaches here - - primarily in first year biology, upper-division service courses, new programs in Science, and faculty development. This work accelerated in 1991-92, when I joined the Science One (Sc1) planning team. There I met for the first time a critical mass of science professors who were similarly committed. My most important contributions to Sc1 planning included clarifying theoretical bases on which the program could rest and facilitating scenario-building as a method of planning.

During 3 years of teaching in Sc1, I provided leadership for developing a highly interactive atmosphere characterized by both rigour and trust. Participants (students, faculty, and lecturers) actively risk exposing their ignorance, and risk questioning in a way that leads them powerfully and cooperatively to understanding. Because Sc1 is deeply interdisciplinary within science, even professors have abundant opportunity to question from their own ignorance, and most of them

come to do that constructively and without embarrassment. I also teach in and have Co-Directed the Coordinated Sciences Program, adapted from Sc1to bring the benefits of cross-disciplinary bridging and interactive engagement among students to larger numbers of first-year students.

I teach in and have directed the Integrated Sciences degree program, which applies principles developed in Sc1 at the upper-division level. In addition to allowing students to construct their own 2-year cross-disciplinary curricula for graduation, the program applies in its "core" courses the fact that much of the essence of science lives not just within but among traditional disciplines, and not just within but among individuals. My co-taught course, "*The sizes of things*", gets rave reviews from students and serves as a model and test platform for the program.

During 1996-97 I was seconded to the Faculty of Science as "special consultant to the biology program". In addition to serving on various committees, I spent the year consolidating my understanding of learning theory, listening to students and faculty speak about teaching and learning, and helping colleagues discover ways to implement more effective approaches in their teaching. In fall 1997 I spent a month as Visiting Professor at the University of Maryland, Baltimore County, where I consulted on interactive approaches to learning . For 3 months in early 1998 I was a Visiting Professor at the National University of Singapore, and NUS has implemented many of the changes I recommended. Consulting work in science education includes my work with executives of TechBC and Guelph University on interdisciplinary and interactive approaches, and workshops for faculty at many universities in the US and Canada on a variety of topics such as *teaching for creativity*, *fostering strong interaction among students*, etc. Since 2002 I have given numerous workshops and keynote addresses on various educational topics at conferences sponsored by McGraw-Hill Ryerson book company, and consulted with the company itself on strategic issues. This work continues to expand.

In April 1999 I was awarded the Killam Teaching Award of the Faculty of Science, in July 1999 I was awarded a 3M Teaching Fellowship (national), and in February 2002 I was awarded the CASE/CCAE Canadian Professor of the Year award (national). In September 2002 I was Distinguished Visiting Teaching Professor at Guelph University.

From spring 2003 to March 2004 I promoted the notion of a research Institute for the Scholarship of Teaching and Learning at UBC, which was passed by Senate and funded in 2004. From my retirement in March 2004 until March 2006 I worked under contract continuing to develop the institute.

Guest Lectures at UBC

Oct. 1996 EPSE 313 (Education). UBC. (Monique Bournot-Trites, Prof.)
Jan. 1997 MLED 393/394 (Modern Languages). UBC. (Monique Bournot-Trites, Prof.)
Apr. 1997 Science Education 409 (Bob Carlisle, Prof.)
Mar. 1997 Biology 332 (Protistology) UBC. (Jim Berger, Prof.)
Oct. 1997 Biol. 110 (General Biology), Univ. of Maryland, Baltimore County (P. Sokolove, Prof.)
Sept. 1997 EPSE 313 (Education). UBC. (Monique Bournot-Trites, Prof.)
Feb. 1998 Biol. 473 (Behavioural Ecology). Nat. Univ. of Singapore (N. Sodhi, Prof.)
Feb. 1998 Biol. 120 (General Biology). Nat. Univ. of Singapore (N. Sodhi, Prof.)
Sept. 1999 Physics 110. (Coordinated Science Program). UBC. (Jim Carolan, Prof.)
Oct. 1999 EPSE 506. (Seminar in University Teaching Methods). UBC. (Peter Frost, Prof.)
Nov. 1999 Biol. 120 (General Biology). UBC. (Max Taylor, Prof.)
Mar. 2000 Biol. 448I (Student-directed; Patterns in Nature). (Martin Adamson, sponsor)
Sept. 2000 Physics 110. (Coordinated Science Program). UBC. (Jim Carolan, Prof.)

Oct. 2000 EPSE 506. (Seminar in University Teaching Methods). UBC. (Peter Frost, Prof.)
Mar 2002 EPSE 506. (Seminar in University Teaching Methods). UBC. (Peter Frost, Prof.)
Mar 2003 EPSE 506. (Seminar in University Teaching Methods). UBC. (Peter Frost, Prof.)

Graduate Students Supervised

Student Name	Program Type	Completion	Supervisor
Perkins, Mary	M.Sc.	1977	C.L. Gass
Runyan, Craig	M.Sc.	1979	C.L. Gass
Picman, Jaroslav	Ph.D.	1980	C.L. Gass
Lertzman, Ken	M.Sc.	1981	C.L. Gass
Armstrong, Douglas	M.Sc.	1986	C.L. Gass
Paton, Steve	M.Sc.	1986	C.L. Gass
Sutherland, Glenn	M.Sc.	1986	C.L. Gass
Tamm, Stephan	Ph.D.	1986	C.L. Gass
Cahoon, Peter	Ph.D.	1987	C.L. Gass
Brown, Gayle	Ph.D.	1992	C.L. Gass
Roberts, Mark	M.Sc.	1992	C.L. Gass
Thompson, James	M.Sc.	1994	C.L. Gass
Garrison, Jennifer	M.Sc.	1995	C.L. Gass
McIntyre, Gordon	M.Sc.	1995	C.L. Gass
Chatters, Lara	M.Sc.	1996	C.L. Gass
Harms, Elvira	M.Sc.	1996	C.L. Gass, J. Ford
Moore, Janet	M.Sc.	1997	C.L. Gass
Wilhelmson, Christianne	M.Sc.	1999	C.L. Gass
Shields, Beth	M.Sc.	2000	C.L. Gass
Ricardo Rosado	Ph.D. (Education)	discontinued	C.L. Gass, C. Leggo
Kull, Bob	PhD (interdiscipl)	2005	C.L. Gass, D. Tait
Vergara, Valeria	PhD	continuing	C.L. Gass, L. Barrett-Lennard

Graduate Committees

I have served on 40 PhD supervisory committees other than those of my own students. These committees include 4 at SFU and span 7 Faculties at UBC (1 Agriculture, 1 Arts, 1 Commerce, 3 Education, 4 Forestry, 1 Graduate Studies (Planning), and 23 Science. Two were in Interdisciplinary Studies. Similarly, I have served on 28 MSc supervisory committees (1 SFU, 2 Agriculture, 1 Arts, 3 Forestry, 20 Science). I have served on 9 PhD committees after having served on the same students' MSc committees (2 SFU, 1 Arts, 1 Planning, 5 UBC Science).

Professional personnel who have worked with me

Postdoctoral Fellows

1981	Rusterholz, K., Private funding
1982	Getty, Thomas, NATO
1983-84	Stephens, D.W., NATO
1989-90	Temeles, E.J., NATO
1996-97	Sun, Chin, Private funding

Sabbatical Visitors and Visiting Scientists

1981-82	K.E. Evans, Professor, Dept. of Biology, California State Univ., Chico.
1982-85	At least one several-week visit each year. R.S. Miller, Professor, School of Forestry & Environmental Studies, Yale Univ.
1995-97	Summers. Sara Hiebert, Assistant Professor, Dept. of Biology, Swarthmore College,
1996-98	Summers. Raul Suarez, Assistant Professor, Dept. of Biological Sciences, Univ. of California, Santa Barbara, CA.

Consultancies

April 1996. National University of Singapore. Consultation on a new interdisciplinary program for undergraduates

February-March 1997. School of Pharmacy, UBC Consultation on a student survey of teaching effectiveness.

September 1997. University of Maryland, Baltimore County. Consultation on experimental first-year biology program.

January-March 1998. National University of Singapore. Visiting Professor. Teaching in and consultation on Special Program in Science.

May 1998. Technical University of British Columbia. Consultation on interdisciplinary first year program, all disciplines.

November 1998. Technical University of British Columbia. Consultation on interdisciplinary first year program, all disciplines.

April 1999. National Center for Ecological Analysis and Synthesis. Curriculum planning theory for *Theories for Sustainable Futures* course.

April, May 1999. Emory University. Planning integrated studies curriculum.

May 1999. Technical University of British Columbia. Consultation on interdisciplinary first year program, all disciplines.

February 2000. National Center for Ecological Analysis and Synthesis. Final planning for course: *Theories for Sustainable Futures*.

May 2000. National Center for Ecological Analysis and Synthesis. Co-teach *Theories for Sustainable Futures* course.

October 2002. Guelph University. Consultation on various educational issues in conjunction with my tenure as Distinguished Visiting Teaching Professor.

June 2003. McGraw-Hill Ryerson. Consulted with President and Vice President of Higher Education Division about long-term strategic issues.

January 2004. McGraw-Hill Ryerson. Observed annual winter sales meeting, then produced report.

June, December 2004. McGraw-Hill Ryerson. Conducted 3 workshops and produced report on *The Future of Higher Education in Canada*.

Service to the community

1986-87 President, Sculptors' Society of British Columbia

1988-96 Participant in Scientists in the Schools program
Speaker on sculpture and Art/Science relationships.

1994 Article on my research in all Vancouver Sun-related newspapers
CBC Evening news article on my research
CBC Radio interviews: "Midday"
CBC Network Radio interviews: "The Vickie Gabereau Show"
Two nationally-syndicated newspaper articles on my research. Letters to editor in many newspapers regarding these.

1995 Developed a 6-week elementary school curriculum on hummingbirds for all grades. Includes many opportunities for community involvement in the school. This curriculum was implemented in Galiano School in 1995, and is being considered now in Seattle and other places. This project included personal appearances in the school and a public lecture for the adult community, as well as consultation with teachers and community participants, and resulted in a half-page article in the *Vancouver Sun*. This project was a collaboration with a non-academic colleague.

1995 Speaker on Art/Science at the 7th International Stone Sculpture Symposium, Mount Vernon, WA.

1996 TV interview for a Northern Native Television documentary on eagles.
Articles on my work in UBC Reports (2)

1997 Article on my laboratory in UBC Reports. This drew a guest lecture from an elementary science class.

1998 Article on my teaching in UBC Reports.

1999 Article on my teaching in UBC Alumni magazine.
Article on my 3M Teaching Fellowship in the Vancouver Sun.
Article on my 3M Teaching Fellowship in UBC Reports.
Speaker on integrating personal and professional living. Centre for Spiritual and Ethical Development. Spiritual development in the workplace (series). "Art and Science: Getting them together". Vancouver.

1999. Speaker on professionalism. Carnegie Centre Discussion Group
Article on my teaching in UBC Reports.
Featured in UBC Annual Report

2001 Speaker on science. Carnegie Centre Discussion Group
Article on my teaching in Vancouver Sun

2001	Speaker on science. Carnegie Centre Discussion Group
	Speaker for Philanthropic and Educational Organization
	Article on my teaching in Vancouver Sun
	Article on my teaching in Trek alumni magazine
	Article on my teaching in The UBYSSEY
	Featured in Macleans Magazine annual universities issue
	Speaker at Vancouver School Board in-service session for science teachers
	BBC radio program on my research
2002	Vancouver Institute lecture
2003	Founders Committee, International Society for the Scholarship of Teaching and Learning.

AWARDS AND DISTINCTIONS

Awards for Teaching (indicate name of award, awarding organizations, date)

1999	Killam Teaching Award. Faculty of Science. UBC
	3M Teaching Fellowship. National
2002	CASE/CCAE Canadian University Professor of the Year. National
	Distinguished Visiting Teaching Professor. Guelph University
	Golden Key Honourary Membership. UBC

INVITED LECTURES

Before 1983, when I became Associate Professor, I gave 26 invited talks, including talks at 15 universities (Albany (SUNY), Chico State, Cornell, Humboldt State, UC Irvine, Massachusetts (Amherst), Oregon, Oregon State, Ottawa, Queens, Stony Brook (SUNY), Syracuse, UBC (3 Faculties: Arts, Graduate Studies, Science), Washington, Yale). Others were in 2 special conferences, 1 high school, and 1 community centre.

Between 1983 and 2004 I have given over 100 invited talks at 28 universities (Alberta, Brock, Calgary, Carleton, Connecticut, Colorado, Colorado State, Emory, Florida, Guelph, National Institute of Education (Singapore), Maryland (Baltimore County), Munich, National University of Singapore, Northern BC, Open University of BC, Oregon, Ottawa, Princeton, Queens, Simon Fraser, Stanford, TechBC, Toronto, UBC (5 Faculties: Applied Science, Arts, Education, Graduate Studies, Science), UC Berkeley, UCLA, Victoria), 6 Colleges (Capilano, Cariboo, Dawson, Centennial, Langara, Okanagan), 2 professional organizations, 7 community organizations, one school district,, and one elementary school. During this period the scope of my public and academic speaking has broadened greatly. One measure of breadth is the proportion of my talks in science, education and art. A measure of the broad appeal of my work is that I am increasingly asked to talk to administrators as well as to faculty. Another important measure is that I am often asked to talk about one of these domains to audiences in another domain.

More than half of my invited talks during this time have been on education or on art. One was on the linguistics of science education, and the remainder were on science or science education. All of my art talks were illustrated largely by my own sculpture, which I produce professionally; most of those used problems in esthetics and perception to address

fundamental scientific problems in visual perception. Six of my art talks have been in Science Faculties (Maryland (Baltimore County), National University of Singapore, Princeton, Simon Fraser, UBC) and 5 of my science talks have been either for arts organizations or an international conference on art education. One art talk was in a year-long Humanities Forum at Maryland (Baltimore County). I gave 2 ScienceFirst lectures at UBC, one on education and one on art. Increasingly, I am asked either to talk about innovative projects in science education at UBC or to address special problems in education such as promoting interactive engagement among students or faculty, promoting interdisciplinary collaboration, and promoting creative problem solving. One science education talk was for the National Institute of Education in Singapore. Another science education talk in Singapore attracted participants from 5 Faculties at the National University (Applied Science, Arts, Dentistry, Medicine, and Science), from the National Institute of Education, and from several local high schools and colleges (I was told that this had never happened before), and the videotape of that talk is still used in Singapore.

RESEARCH

My primary scientific research since coming to UBC has spanned several levels of organization in hummingbird biology, integrated by the theme of energetics. In 2000 I chose not to renew my research funding, close my laboratory, and accept no new graduate students in scientific research. However, my collaborations with colleagues in other places continue, and I am currently supervising or co-supervising three PhD students (one in Zoology, on in Interdisciplinary Studies, and one in Education. An important collaboration is with a bat researcher in Germany, who is applying methodology and experiments I developed for hummingbirds to his work with pollinating bats. I have traveled to Munich three times since 2001 for this work. Recently, my research has expanded into two new areas.

Increasingly, I have been developing theory for understanding phenomena commonly encountered in the classroom, and writing about practice. This work is generated largely by the novel social environments that we create in Science One and the Integrated Science Program, by the kinds of interactions among students and among faculty that predominate in those environments, and by the startlingly strong intellectual growth of our students. UBC's new Institute for the Scholarship of Teaching and Learning is an extension of that work. As it develops, it will greatly expand the scope, extent, and depth of research into the effectiveness of pedagogy, curriculum, and programs at UBC.

My work as a professional sculptor raises many scientific questions about perception of three dimensional form and its evolution, and about the coordination of movements of sculptors' bodies to produce esthetically pleasing forms through subtractive sculpture. This work, which has produced several new methods to aid in visualizing form, is leading toward a comprehensive theory of the evolution of the sense of form in humans and other animals. The work also includes a major engineering project in my studio, for which I have employed several undergraduate phyics and computer science students for the last several years. We are developing a Stewart Platform. This is a large, computer-controlled, six-degree-of-freedom positioning device that will allow me both to reproduce existing sculptures at any scale, either

exactly or after geometric transformations of various kinds, and to evaluate mathematically the forms that I and others create. To date, I have self-financed this work and communicated it through lectures and non-referreed publications in art journals, and I was invited to include my latest commission on a commercial web site (http://microscribe.com/gallery). In 2002, that commissioned piece was donated to the UBC Faculty of Science, and is installed in a prominent location on campus. My artistic work is developing rapidly as both a scientific and an artistic pursuit.

PUBLICATIONS

Refereed publications (published or in press) (of primary importance)*

I include myself as author of publications produced by students working in my laboratory only if I contribute to the work well beyond that required in my role as thesis supervisor. We discuss the implications of this policy at the beginning of and throughout each student's tenure, and this heightens their awareness of their progress toward independence, and promotes it. We usually know near the beginning of any piece of work whether I'll be an author of its publication, and we've always agreed completely on this, either way. Some publications in this list include me as author, but all of them report on work done during the tenure of my students' degree programs, in and funded by my laboratory. I do not include 4 papers published by my students during their degree programs in collaboration with other research groups. Three include undergraduate students as authors, and in one of these the student is senior author.

Gass, C.L., G. Angehr, and J. Centa. 1976. Regulation of food supply by feeding territoriality in the Rufous hummingbird. *Canadian Journal of Zoology* 54(12): 2046-2054.

Gass. C.L. 1977. A digital encoder for field recording of behavioral, temporal, and spatial information in directly computer-accessible form. *Behaviour Research Methods & Instrumentation* 9(1): 5-11.

Gass, C.L. 1978. Experimental studies of foraging in complex laboratory environments. *American Zoologist* 18: 617-626.

Gass, C.L. 1978. Rufous hummingbird feeding territoriality in a suboptimal habitat. *Canadian Journal of Zoology* 56: 1535-1539.

Gass, C.L. 1979. Territory regulation, tenure, and migration in Rufous hummingbirds. *Canadian Journal of Zoology* 57: 914-923.

Gass, C.L. and K.P. Lertzman. 1980. Capricious mountain weather: a driving variable in hummingbird territorial dynamics. *Canadian Journal of Zoology* 58: 1964-1980.

Gass, C.L. and R.D. Montgomerie. 1981. Hummingbird foraging behavior: decision-making and energy regulation. *In* A.C. Kamil and T.D. Sargent (editors). Foraging behavior: Ecological, ethological, and psychological approaches. pp. 159-194. Garland Press, New York.

Montgomerie, R.D. and C.L. Gass. 1981. Energy limitation of hummingbird populations in tropical and temperate communities. *Oecologia* 50: 162-165.

Sutherland, G.D., C.L. Gass, P. Thompson, and K.P. Lertzman. 1982. Feeding territoriality in migrant rufous hummingbirds: defense of yellow-bellied sapsucker (*Sphyrapicus varius*) feeding sites. *Canadian Journal of Zoology* 60: 2046-2050.

Lertzman, K.P. and C.L. Gass. 1983. Alternative models of pollen transfer. *In* C.E. Jones and R.J. Little (eds.) Handbook of pollination biology. pp. 474-489. Van Nostrand Reinhold.
Miller, R.S. and C.L. Gass. 1984. Survivorship in hummingbirds: Is predation important? *Auk* 102: 175-178.
Gass, C.L. 1985. Reaching for an integrated science of behaviour. *Behavioural and Brain Sciences* 8: 362.
Gass, C.L. and G.D. Sutherland. 1985. Responses of territorial hummingbirds to experimentally enriched patches of flowers: Energetic profitability and learning. *Canadian Journal of Zoology* 63: 2125-2133.
Miller, R.S., S. Tamm, G.D. Sutherland, and C.L. Gass. 1985. Cues for spatial orientation in hummingbird foraging: the roles of color and location. *Canadian Journal of Zoology* 63: 18-21.
Tooze, Z.J. and C.L. Gass. 1985. Responses of rufous hummingbirds to midday fasts. *Canadian Journal of Zoology* 63: 2249-2253.
Tamm, S. and C.L. Gass. 1986. Energy intake rates and nectar concentration preferences by hummingbirds. *Oecologia* 70: 20-23.
Armstrong, D.P., C.L. Gass, and G.D. Sutherland. 1987. Should hummingbirds remember where they've been? pp. 563-586. *In* A.C. Kamil, H.R. Pulliam, and J.R. Krebs (eds.) Foraging behavior. Plenum Press. New York.
Gass, C.L. 1989. Inferring evolutionary history in pollination biology. Acta, XIV Congressus Internationalis Ornithologici, 1988, Ottawa, Canada: XIX Congressus Internationalis Ornithologicus.
Suarez, R.K., J.R.B. Lighton, C.D. Moyes, G.S. Brown, C.L. Gass, and P.W. Hochachka. 1990. Fuel selection in rufous hummingbirds: ecological implications of metabolic biochemistry. *Proceedings of the National Academy of Sciences USA* 87: 9207-9210.
Gass, C.L. and W.M. Roberts. 1992. The problem of temporal scale in optimization: three views of hummingbird visits to flowers. *American Naturalist* 140: 829-853.
Brown, G.S. and C.L. Gass. 1993. Spatial association by rufous hummingbirds. *Animal Behaviour* 96: 487-497.
Sutherland, G.D. and C.L. Gass. 1995. Learning and memory for spatial pattern in hummingbirds. *Animal Behaviour* 50: 1273-1286.
Gass, C.L., M. Romich and R.K. Suarez. 1999. Energetics of hummingbird foraging at low ambient temperature. *Canadian Journal of Zoology* 77:314-320.
Gass, C.L. and J.S.E. Garrison. 1999. Energy regulation by traplining hummingbirds. *Functional Ecology* 13:483-492.
Hiebert, S.M., M. Ramenofsky, K. Salvante, J.C. Wingfield and C.L. Gass. 2000. Noninvasive methods for measuring and manipulating corticosterone in hummingbirds. General and Comparative Endocrinology 120:235-247.
Garrison, J.S.E. and C.L. Gass. 2000. Response of traplining hummingbirds to changes in nectar availability. *Behavioural Ecology* 10:714-725.
Suarez, R.K. and C.L. Gass. 2002. Hummingbird foraging and the relation between bioenergetics and behaviour. *Comparative Biochemistry and Physiology* 133A: 225-343.
Gass, C.L. 2002. Introduction to the special feature: Educating for integration and sustainability. Conservation Ecology **5**(2): 000. [online] URL: http://www.consecol.org/vol5/iss2/art31
Benbasat, J.A. and C.L. Gass. 2002. Reflections on integration, interaction, and community: the Science One program and beyond. Conservation Ecology **5**(2): 000. [online] URL: http://www.consecol.org/vol5/iss2/art26

Gass, C.L. 2005. Reflections on the notion of 3M Currency. In M. Lerch (*ed.*) Making a difference; a celebration of the 3M Teaching Fellowship. Council of 3M Teaching Fellowships.

Gass, C.L. 2008. In XXX (ed.) Silences in Teaching and Learning: conversations we never had. Council of 3M Teaching Fellowships.

The following publications do not include me as author but report on work done in my laboratory under my supervision.

Picman, J. 1977. Intraspecific nest destruction in the long-billed marsh wren (*Telmatodytes palustris palustris*). *Canadian Journal of Zoology* 55: 1997-2003.

Picman, J. 1977. Destruction of eggs by the long-billed marsh wren (*Telmatodytes palustris palustris*). *Canadian Journal of Zoology* 55: 1914-1920.

Picman, J. 1979. A new trapping technique for female redwing blackbirds. *North American Bird Bander* 4: 56-57.

Picman, J. and A.K. Picman. 1980. Destruction of nests by the short-billed marsh wren, *Cistothorus platensis*. *Condor* 82: 176-179.

Picman, J. 1980. A new trap for long-billed marsh wrens. *North American Bird* 5: 8-10.

Picman, J. 1980. Impact of marsh wrens on reproductive strategy of redwinged blackbirds. *Canadian Journal of Zoology* 58: 337-350.

Picman, J. 1980. Response of red-winged blackbirds to nests of long-billed marsh wrens. *Canadian Journal of Zoology* 58: 1821-1827.

Picman, J. 1981. The adaptive value of polygyny in marsh-nesting red-winged blackbirds: renesting, territory tenacity, and mate fidelity of females. *Canadian Journal of Zoology* 59: 2284-2296.

Picman, J. 1982. Impact of redwing blackbirds on singing activities of long-billed marsh wrens. *Canadian Journal of Zoology* 60: 1683-1689.

MacKenzie, D.I., S.G. Sealy, and G.D. Sutherland. 1982. Nest-site characteristics of the avian community in the dune-ridge forest, Delta Marsh, Manitoba: a multivariate analysis. *Canadian Journal of Zoology* 60: 2212-2223.

Picman, J. 1983. Aggression by redwing blackbirds towards marsh wrens. *Canadian Journal of Zoology* 61: 1896-1899.

Picman, J. 1985. Experimental study on the role of intraspecific and interspecific competition in the evolution of nest-destroying behaviour in marsh wrens. *Canadian Journal of Zoology*

Armstrong, D.P. 1987. Economics of breeding territoriality in male calliope hummingbirds. *Auk* 102: 242-253.

Armstrong, D.P. 1988. The territorial imperative. *Nature Canada* Spring 1988:6.

Armstrong, D.P. 1988. Persistent copulation attempts by a male calliope hummingbird toward newly fledged conspecifics. *Canadian Field Naturalist* 102:259-260.

Gregory, R.S., G.S. Brown, and G.R. Daborn. 1983. Food habits of young alewives, *Alosa pseudoharengus* in Lake Ainslie, Nova Scotia. *Canadian Field Naturalist* 97: 423-466.

Tamm, S. 1985. Breeding territory quality and agonistic behavior: effects of energy availability and intruder pressure in hummingbirds. *Behavioural Ecology and Sociobiology* 16: 203-207.

Walters, C.J. and P. Cahoon. 1985. Evidence of decreasing spatial diversity in British Columbia salmon stocks. *Canadian Journal of Fisheries and Aquatic Sciences* 42: 1033-1037.

Stephens, D.W. and S.R. Paton. 1986. How constant is the constant of risk aversion? *Animal Behaviour*, 34: 1659-1667.

Tamm, S. 1987. Tracking varying environments: sampling by hummingbirds. *Animal Behaviour*, 34: 1725-1734.
Cahoon, P. 1987. Detecting and eliminating spatial bias when tracking foraging behavior in a laboratory environment. *In* M.L. Commons, A. Kacelnik, and S.J. Shettleworth (*eds.*) Quantitative analysis of behavior. Vol. 6: Foraging. Lawrence Erlbaum. New Jersey.
Tamm, S., D.P. Armstrong, and Z.J. Tooze. 1989. Display behavior of male Calliope hummingbirds during the breeding season. *Condor* 91: 172-279.
Tamm, S. 1990. Energetic costs in central place foraging: what do breeding hummingbirds maximize? *Ecology* 70: 195-205.
Temeles, E.J., and W.M. Roberts. 1993. Effect of sexual dimorphism in bill length on foraging behaviour: an experimental analysis of hummingbirds. *Oecologia* 94: 87-94.
Brown, G.S. 1994. Spatial association learning by rufous hummingbirds (Selasphorus rufus): effects of relative spacing among stimuli. Journal of Comparative Psychology 108: 29-35.
Roberts, W.M. 1994. Hummingbirds' concentration preferences and the energetics of feeding: time scale and optimality. *Journal fur Orthinologische* 135: 151.
Roberts, W.M. 1995 Hummingbird licking behaviour and the energetics of nectar feeding. *Auk* 112: 456-463.
Roberts, W.M. 1996. Hummingbirds' nectar concentration preferences at low volume: the importance of time scale. *Animal Behaviour* 52: 361-370.

Non-refereed Publications

This list includes publications in science, education, and art, and includes three of my most important publications (#54 in science, and #63 & #64 in education). It does not include papers on education that I wrote as a consultant.

Gass, C.L. 1985. Behavioural foundations of adaptation. *In* P.P.G. Bateson and P.H. Klopfer (eds.). Perspectives in ethology, Vol. 6, pp. 63-107. Plenum Press, New York.
Gass. C.L. 1986. Review of "Tyrell, E.Q. and R.A. Tyrell, 1985. Hummingbirds: their life and behavior. Crown Publishers, New York." *American Scientist* 74: 194. Reprinted in Discovery 14: 133-134. 1985.
Gass, C.L. 1988, 1990. An essay on the flexibility of behaviour, Ch. 48 (Behavioural adaptations to the environment), and Ch. 49 (Social behaviour). *In* N.K. Wessels and J.L. Hopson. Biology. Random House. New York.
Gass, C.L. 1998. Reflections on students and teachers: a tribute to Deborah Wilson. *Sculpture Northwest*, January/February 1998.
Gass, C.L. 1998. Teaching for creativity: an example. *CDT Link*, Centre for Development of Teaching and Learning, National University of Singapore. July 1998.
Gass, C.L. 1999. Art in other places: Zimbabwean sculpture in Singapore and South Africa. *Sculpture Northwest*, May/June 1999.
Gass, C.L. 1999. Art in other places: a long series of connections to a sculptor I admire. *Sculpture Northwest*, November/December 1999.
Gass, C.L. Reflections of the world in the mirror of my experience. In M. Aleksiuk and T. Nelson (eds.) Nature, environment, and me: explorations of self in a deteriorating world. Unpublished manuscript.
Gass, C.L. 2002. An Exercise in Thinking, Writing, and Rewriting. Great Ideas in Teaching. Benjamin Cummings.
Gass, C.L. 2002. The problem of thinking and writing in science education. CDTL Brief. National University of Singapore.

Technical Reports

Montgomerie, R.D. and C.L. Gass. A bibliography of hummingbird behaviour and ecology. Privately printed. 25 pp. (1980).

Picman, J. and C.L. Gass. Multiple nest building in the long-billed marsh wren as a possible antipredation adaptation. Final technical report to Canadian Wildlife Service on contract research. (1980).

Picman, J. and C.L. Gass. The influence of nest predation on the evolution of clutch size in red-winged blackbirds. Final technical report to Canadian Wildlife Service on contract research. (1980).

Johnstone, M. and C.L. Gass. 1981. Searching success and depression in police dogs: a factor affecting efficiency. Report to Vancouver City Police Department and Province of British Columbia.

Tooze, Z. and C.L. Gass. 1981. Annotated bibliography to expand on the study of "Interest levels: a factor governing efficiency in police service dogs". Report to Vancouver City Police Department and Province of British Columbia.

ASSESSMENT OF PUBLICATIONS

American Naturalist, Functional Ecology, Ecology, and Conservation Ecology are top journals in evolution, ecology and conservation.

Animal Behaviour, Behavioural Ecology and Behavioural Biolgy and Sociobiology are top journals in animal behaviour.

Proceedings of the National Academy of Science is a top journal in many scientific disciplines.

Behavioural and Brain Sciences and Journal of Comparative Psychology are top journals in psychology.

Canadian Journal of Fisheries and Aquatic Sciences is a top journal in fisheries.

Canadian Journal of Zoology is a modest journal in general that is respected in ecology.

American Zoologist is a modest general zoological journal that is respected for publishing symposia.

Oecologia, Auk and *Condor* are modest journals in ecology or ornithology.

Canadian Field Naturalist and North American Bird Bander are mediocre journals in ecology.