



## MG 210 – TC Lacalli fonds

**Dates:** 1970-2001.

**Extent:** 2.24 m; 81.28 cm of textual records; 2,439 photographs; ~ 11, 613 negatives.

**Biography:** Thurston Castle Lacalli was born on 4 August 1946 in Seattle, Washington. He attended the University of Washington, graduating with a BSc in Chemistry in 1968. Lacalli accepted a fellowship at Churchill College, Cambridge, but stayed only one term, was drafted for military service in Vietnam upon his return to the United States, and chose instead to move to Canada. He enrolled at UBC, where he earned his PhD in Zoology in 1973. He had post-doctoral fellowships at McGill and UBC prior to accepting a position at the University of Saskatchewan in 1977. By 1985 he had been made a full professor. Lacalli has authored over 57 academic papers and has frequently been invited to give conference presentations regarding his work. He retired from the University in 2001.

**Scope and content:** Dr. Lacalli's research involves the embryology and larval forms of marine invertebrates: principally, the development of the nervous system and the formation pattern in these organisms. His work has included theoretical, computer-based studies of how pattern and formation appear *de novo* in embryos as they develop, and microanatomical studies (primarily, via serial electron microscopy) of the developing nervous system in simple invertebrates near the evolutionary stem from which vertebrates, with their advanced nervous system, evolved. The process developed by Lacalli enabled an image of the whole body of their specimens in one micrograph, a relatively rare achievement and one which enabled him to analyse the nervous system in far more detail than was previously possible. This fonds contains an extensive collection of the electron micrographs taken by Lacalli, together with research notes, offprints, and other documentation relating to his research activities. It has been organized into 3 series:

**Arrangement:** The fonds has been arranged in the following series.

1. Personal
2. Published Articles, Conference Presentations, Notebooks
  - .1 Articles & Conference Presentations
  - .2 Notebooks
3. EM Images and Negatives
  - .1 Print Files - Phoronid Actinotroch Larvae
  - .2 Print Files - Echinoderm Larvae
  - .3 Print Files - Chordate Embryos and Larvae
  - .4 Print files - Müller's Larva and Trochophores
  - .5 Negatives
  - .6 Images Used in Website

**Restrictions:** Permission is granted to the University of Saskatchewan for use of images for any

non-commercial academic purpose (teaching or research), including electronic reproduction on websites. T.C. Lacalli must be contacted for permission for commercial use. For all use, proper credit must be given; please consult archivist.

Donated to the University Archives by Dr. T.C. Lacalli; accessions 1998-62 and 2001-047; 2002-049.

*Edited for formatting by Amy Putnam, September 2017.*

Further accruals expected.

**Series 1: Personal.** - 1972-2001. - 20.32 cm of textual records.

1. Biography / CV. - 2001.
2. Correspondence on Personal and Developmental Topics. - 1972-1996. - textual records, 1 colour photograph.  
Correspondence with NJ (John) Berrill. Berrill was Strathcona Professor of Zoology at McGill, and one of the best-known (internationally) Canadian biologists of his generation. He received an FRS for his work on tunicates and chordate evolution in the early 1950s. Berrill was the external examiner for Lacalli's PhD thesis, and they continued to correspond until Berrill's death in 1996. Includes some "homespun" cards and two of Berrill's offprints, "The Pearls of Wisdom: An Exposition" and "The pleasure and practice of biology."
3. Miscellaneous Correspondence on Pattern Formation. - 1987-1999.  
Notes and correspondence with numerous colleagues.
4. Selected Pattern Formation Correspondence. - 1979-1996. - 2 folders.  
Correspondence, primarily with Lionel Harrison and Axel Hunding, two of Lacalli's main collaborators during this period.
5. Documents from First Sabbatical Leave 1983-1984. - 1982-1984.  
Newspaper clippings, correspondence, and a copy of the sabbatical leave report.
6. Documents from Second Sabbatical Leave 1990-1991. - 1989-1991.  
Correspondence, a copy of the sabbatical leave report, etc.
7. *Morphogenesis in Micrasterias*. - 1973.  
Bound copy of thesis submitted for PhD in Zoology, UBC.
8. Notes for Research Seminars. - 1976-1993.  
Lecture notes and overheads.
9. Original Drawings.  
A selection of drawings used in various publications. See also oversize.
10. PhD Research Journals. - 1969-1973. - 3 folders.  
Five journals, with extensive dated entries regarding work relating to *Micasterias* and other algae.
11. Research Grant Applications. - 1977-1998.

Includes referees comments.

**Box 2**

**Series 2: Published Articles, Conference Presentations, Notebooks.** - 1970-2000. - 60.96 cm of textual records, 5 photographs.

The material in this series has been organized in chronological order within each subseries.

**Subseries 1: Articles & Conference Presentations.** - 1970-2000. - 32.32 cm of textual records, 5 photographs.

12. Early *Micrasterias* Papers from PhD. - 1970-1976, 1980.  
Includes correspondence with Francis Crick and CH Waddington on patterning; offprints of "Morphogenesis in *Micrasterias*: I. Tip Growth; II. Patterns of morphogenesis; III. The Morphogenic Template;" "Tip Growth in *Micrasterias*;" "Cytokinesis in *Micrasterias rotata*: Problems of Directed Primary Wall Deposition."
13. Arenicola Manuscript (1978). - 1972-1977, 1986.  
Correspondence with co-author Joan Marden from field sites (Huntsman Marine Lab, St. Andrews, NB, and Bellairs Research Institute, Barbadoes); copy of offprint, "Morphology and behaviour of the benthic larva of *Arenicola cristata* (Polychaeta)."
14. Desmid Pore Manuscript (1978). - 1978.  
Correspondence, original manuscript, and notes, together with a copy of the offprint, "Development of Ordered Arrays of Cell Wall Pores in Desmids: a Nucleation Model" (Lacalli and Harrison).
15. Hyperchirality Manuscript (1978). - 1974-1978.  
Correspondence, copy of offprint, "Hyperchirality: a mathematically convenient and biochemically possible model for the kinetics of morphogenesis" (Lacalli and Harrison).
16. First Turing Model Manuscript (1978). - 1976-1978.  
Correspondence, notes, and copy of offprint, "The Regulatory Capacity of Turing's Model for Morphogenesis, with Application to Slime Moulds" (Lacalli and Harrison).
17. Second Turing Model Manuscript (1979). - 1977-1979.  
Correspondence, working draft, notes, and copy of offprint, "Turing's Conditions and the Analysis of Morphogenetic Models" (Lacalli and Harrison).
18. Larval Monograph (1980). - 1975-1981.  
Correspondence, illustrations.

19. Algal Morphogenesis Manuscript (1981). - 1975-1986.  
Correspondence, notes, and a copy of the offprint, "Dissipative structures and morphogenetic pattern in unicellular algae."
20. Apical Tuft Manuscript (1981). - 1979-1981.  
Correspondence, copy of the offprint, "Structure and development of the apical organ in trochophores of *Spirobranchus polycerus*, *Phyllodoce maculata* and *Phyllodoce mucosa* (Polychaeta)."
21. Passamaquoddy Bay Manuscript (1981). - 1975-1981.  
Correspondence, notes, illustrations, and copy of the offprint, "Annual spawning cycles and planktonic larvae of benthic invertebrates from Passamaquoddy Bay, New Brunswick."
22. 40<sup>th</sup> SDB Symposium Manuscript (1981). - 1979-1981.  
Correspondence, offprint of "Reaction-Diffusion Models and Desmid Morphogenesis."
23. Müller's Larva Manuscript (1982). - 1979-1982.  
Correspondence, figure sketches and mock-ups, offprint of "The nervous system and ciliary band of Müller's larva."
24. Müller's Larva CNS Manuscript (1983). - 1982-1983.  
Illustrations, reviewer comments, copy of offprint, "The brain and central nervous system of Müller's larva."
25. Major Trochophore Manuscript (1984). - 1980-1984.  
Correspondence, illustrations, and a copy of the offprint, "Structure and organization of the nervous system in the trochophore larva of *Spirobranchus*."
26. Hydra Morphogenesis Manuscript (1984). - 1980-1988.  
Includes correspondence with Lewis Wolpert, editor of the Journal of Theoretical Biology and others; notes; original working draft, and a copy of the offprint, "Theory and experiment in morphogenetic modelling: an examination of MacWilliams' data on hydra."
27. Pilidium Manuscript (1985). - 1984-1985.  
Correspondence, reviewer comments, illustrations, and copy of offprint, "The nervous system of a pilidium larva: evidence from electron microscope reconstruction" (Lacalli and West).

28. Prototroch Manuscript (1985). - 1983-1985.  
Correspondence, notes, copy of offprint, "Prototroch structure and innervation in the trochophore larva of *Phyllodoce* (Polychaeta)."
29. *Florometra* Manuscript (1986). - 1986.  
Correspondence, illustrations, and offprint: "Ciliary band formation in the doliolaria larva of *Florometra*: I. the development of normal epithelial pattern" (Lacalli and West).
30. *Florometra* Manuscript II (1987). - 1982-1987.  
Correspondence, illustrations, and offprint: "Ciliary band formation in the doliolaria larva of *Florometra*: II. Development of anterior and posterior half-embryos and the role of the mesentoderm" (Lacalli and West).
31. *Micrasterias* Theory Manuscript (1987). - 1981-1987.  
Particularly interesting for the conflicting reviewer comments; also includes notes, and offprint: "Turing's model and branching tip growth: relation of time and spatial scales in morphogenesis, with application to *Micrasterias*" (Lacalli and Harrison).
32. Dinoflagellate Cyst Manuscript (1987). - 1981-1987. - textual records and 3 photographs.  
Correspondence, notes, copy of "Environmental Control of Phytoplankton" by Parsons and Takahashi, together with copy of offprint, "The cysts and skeletal elements of dinoflagellates: speculations on the ecological causes for their morphology and development" (Sarjeant, Lacalli and Gaines). The photographs were used for illustrative purposes in the article: models of nonspinose dinoflagellate cysts; models of spiny cysts. See also WAS Sarjeant fonds at the SAB.
33. Echinoderm Symposium Manuscript (1987). - 1984, 1987.  
Correspondence, speaking notes, copy of offprint: "Ciliary band patterns and pattern rearrangements in the development of the doliolaria larva."
34. First Stripe Manuscript (1988). - 1987-1988.  
Correspondence, reviewer comments, original version of article and copy of offprint, "Theoretical aspects of stripe formation in relation to *Drosophila* segmentaiton" (Lacalli, Wilkinson, Harrison). Includes journal cover utilizing Lacalli illustrations.
35. Larval Eye Manuscript (1988). - 1986-1988.  
Correspondence, illustrations, copy of offprint: "Structural correlates of photoresponse in trochophore larva."

36. Phyllodoce Manuscript (1988). - 1977-1987.  
Correspondence, illustration, copy of offprint: "The larval reticulum in *Phyllodoce* (Polychaeta, Phyllodocida)."
- Box 3**
37. Spirobranchus Foregut Manuscript (1988). - 1985-1988.  
Notes, illustrations, correspondence, copy of offprint, "Foregut innervation in juvenile *Spirobranchus spinosus* (Polychaeta)" (Lacalli and West).
38. Suboral Plate Manuscript (1988). - 1987-1988.  
Illustrations, notes, copy of offprint: "The suboral complex in the Müller's larva of *Pseudoceros canadensis* (Platyhelminthes, Polycladida)."
39. Nature Letter (Drosophila Stripes) (1989). - 1989.  
In response to an article by Dr. Michael Akam, "Making stripes inelegantly."  
Includes copies of in-coming and out-going e-mail correspondence with Akam.
40. Second Stripe Manuscript (1990). - 1988-1991.  
Correspondence, notes, copy of offprint: "Modeling the *Drosophila* Pair-Rule Pattern by Reaction-Diffusion: Gap Input and Pattern Control in a 4-Morphogen System."
41. Phoronid Manuscript (1990). - 1988-1990.  
Notes, correspondence, and offprint of "Structure and Organization of the Nervous System in the Actinotroch larva of *Phoronis Vancouverensis*."
42. Echinoderm Ciliary Bonds (1990). - 1990-1991.  
Correspondence, illustrations, notes, etc. for two papers: "Ciliary band innervation in the bipinnaria larva of *Pisaster ochraceus*" (Lacalli, Gilmour and West) and "Ciliary reversal and locomotory control in the pluteus larva of *Lytechinus pictus*" (Lacalli and Gilmour). Offprints of each are included.
43. Gradient-Reading Review (1991). - 1990-1991.  
Correspondence, notes, and offprint of "From gradient to segments: models for pattern formation in early *Drosophila embryogenesis*" (Lacalli and Harrison).
44. Gordon Conference on Bio Mathematics (1992). - 1992. - textual records and photograph.  
Correspondence, overheads, etc. Includes a group photo; individuals identified.
45. Nato Workshop Manuscript (1992). - 1992. - textual records and photograph.

- Notes, overhead for oral presentation, as well as invited paper, “Controlling reaction-diffusion pattern with gradients: lessons from *Drosophila*, and trajectories through parameter space.” Includes a group photo of participants; individuals identified.
46. American Society of Zoologists Symposium (Los Angeles) (1993). - 1993.  
Correspondence, notes, and offprint of presentation, “Apical Organs, Epithelial Domains, and the Origin of the Chordate Central Nervous System.” Includes journal cover utilizing Lacalli illustrations.
  47. Apical Process Manuscript (1993). - 1992-1993.  
Correspondence, notes, and offprint of “A distinctive nerve cell type common to diverse Deuterostome larvae: Comparative data from Echinoderms, Hemichordates and Amphioxus” (Lacalli and West).
  48. Echinoderm Homology Manuscript (1993). - 1992-1993.  
Correspondence and offprint of “Ciliary Bands in Echinoderm Larvae: Evidence for Structural Homologies and a Common Plan.”
  49. Craniate Symposium (1995). - 1994-1995.  
Correspondence, notes.
  50. Amphioxus CNS Landmarks (1994). - 1991-1994.  
This was the first paper in a long series on Amphioxus CNS – a major project undertaken by Lacalli’s lab from 1990-2001. This article is still the most influential and frequently cited of the series. The file includes extensive correspondence with various colleagues, and a copy of the offprint, “Landmarks in the anterior central nervous system of amphioxus larvae” (Lacalli, Holland and West).
  51. Amphioxus Frontal Eye Manuscript (1996). - 1995-1996.  
Correspondence, copy of offprint: “Frontal eye circuitry, rostral sensory pathways and brain organization in amphioxus larvae: evidence from 3D reconstructions.”
  52. Mesodermal Pattern Manuscript (1996). - 1996.  
Correspondence and offprint, “Mesodermal pattern and pattern repeats in the starfish bipinnaria larva, and related patterns in other deuterostome larvae and chordates.”
  53. Dorsoventral Inversion Manuscript (1996). - 1995-1996.  
Correspondence, copy of offprint: “Dorsoventral axis inversion: a phylogenetic perspective.” Includes journal cover utilizing Lacalli illustrations.



54. Diplozoon Hypothesis Manuscript (1997). - 1995-1997.  
Includes correspondence with various colleagues - particularly interesting as the core idea of the paper may prove to be seminal; original manuscript, illustrations, and copy of offprint, "The nature and origin of deuterostomes: some unresolved issues." Includes journal cover utilizing Lacalli illustrations.
55. Salp Ganglion Manuscript (1998). - 1996-1998.  
Extensive correspondence with co-author; copy of offprint, "The developing dorsal ganglion of the salp *Thalia democratica*, and the nature of the ancestral chordate brain" (Lacalli and Holland).
56. Amphioxus Oral Plexus Manuscript (1999). - 1999.  
Correspondence, illustrations, copy of offprint: "The oral nerve plexus in amphioxus larvae: function, cell types and phylogenetic significance" (Lacalli, Gilmour and Kelly). Includes journal cover utilizing Lacalli illustrations.
57. Stolon Hypothesis Manuscript (1999). - 1995-1998.  
Reviewer comments, correspondence, draft of original manuscript and copy of offprint: "Tunicate tails, stolons, and the origin of the vertebrate trunk." Includes journal cover utilizing Lacalli illustrations.
58. Amphioxus Motoneuron Manuscript (1999). - 1998-1999.  
Correspondence and two offprints: "Somatic motoneurons in amphioxus larvae: cell types, cell position and innervation patterns" (Lacalli and Kelly) and "A reexamination of the epithelial sensory cells of amphioxus (*Branchiostoma*)" (Lacalli and Hou).
59. Doliolaria Transformation Manuscript (2000). - 2000.  
Correspondence, illustrations, copy of offprint: "The auricularia-to-doliolaria transformation in two aspidochirote holothurians, *Holothuria mexicana* and *Stichopus californicus*" (Lacalli and West).
60. Amphioxus Balance Organ Manuscript (2000). - 1999-2000.  
Correspondence, reviewer comments, copies of "Cell morphology in amphioxus nerve cord may reflect the time course of cell differentiation" and "The infundibular balance organ in amphioxus larvae and related aspects of cerebral vesicle organization" (Lacalli and Kelly).
61. Echinoderm Budding Manuscript (2000). - 1999-2000.  
A controversial paper; includes extensive material regarding reviewer comments, as well as a copy of the offprint, "Larval budding, metamorphosis, and the evolution of life-history patterns in echinoderms."

**Subseries 2: Research Notebooks.** - 1973-1993. - 28.64 cm of textual records.

62. Larvae Biology. - 1973-1978. - 2 folders.  
Initial larval studies conducted as an NSERC post-doctoral fellow at McGill University. Three journals.
63. Field Notes and Experiments. - 1974-1975.  
Larval observation notebook from Post-doctoral year in Barbados.
64. Early Pattern Work. - 1975-1977.  
Journal documenting pattern formulation work; primarily from PhD studies, but continued at U of S.
65. St. Andrew's. - 1977.  
Data on larvae research.
66. Friday Harbour. - 1978, 1987. - 2 folders.  
Two volumes contain data on larvae research, and include a group photo from the International Coelenterate Congress. The third volume includes notes from the Northwest Regional Developmental Biology Conference (Friday Harbour) and the Annual Meeting of the Canadian Microscopical Society (Winnipeg).
67. Barbados 1980. - 1980-1981.  
Two journals
68. Boulder. - 1981.  
Notes from the 40th Growth Symposium.
69. Sabbatical 1983. - 1983-1984. - 2 folders.  
Three journals: general notes; larval observations, Great Barrier Reef; research in Sydney.
70. Southampton. - 1984.  
Notes on European Developmental Biology Congress.
71. Barbados 1986. - 1986.
72. Computer Logbook. - 1987.
73. Cambridge / Toronto. - 1988.

**Box 4**

Includes notes on discussions with colleagues, as well as research data.

74. *Drosophila* Pattern. - 1988-1993.

Notes, references and ideas on pattern formation, primarily of pair-rule stripes in *Drosophila*. Begun as part of an exchange at Cambridge; initiative based on a talk by Walter Gehring in 1984.

**Box 5**

**Series 3: EM Prints and Negatives.** - 143.28 cm: 2, 439 photographs, approximately 11, 613 negatives.

Subseries 1: Print Files - Phoronid Actinotroch Larvae. - 743 photographs.

75. Phoronid Larvae - Specimen 6 - Apical Neuropile Series. - 51 photographs.

Includes *P. vancouverensis* specimen 6: Apical Neuropile series (never analysed in detail).

76. Phoronid Larvae - Specimen 5 - Apical Organ Series. - 46 photographs.

Includes *P. vancouverensis* specimen 5: Apical organ series (never analysed in detail).

77. Phoronid Larvae - Specimen 5 - Tentacle Nerve Series. - 63 photographs

*P. vancouverensis* specimen 5: Tentacle nerve series. Includes several individual sensory cells; sensory cells from the dorsal part of the tentacle nerve, good images of cell, rootlet and apical microvilli; tangential series - base of tentacle nerve (details).

78. Phoronid Larvae - Specimens 5 & 6 - Miscellaneous Details. - 47 photographs.

Includes *P. vancouverensis* specimen 6: rootlet and nerve details; pharyngeal valve; tentacle nerve - details of junctions and synapses; lower hood nerve details. Specimen 5: ciliary rootlet details.

79. Phoronid Larvae - Specimens 5 & 6 - Publication Photos and Photogenic Surveys. - 53 photographs.

Photos used in academic articles are identified within the file; also includes a selection of medium power survey photos; low power survey images, showing whole body.

80. Phoronid Larvae - Specimen 6 - Tentacle Nerve Series B. - 62 photographs.

Includes series through a sensory cell, with rootlet system; and tangential sections : base of tentacle nerve.

- 81. Phoronid Larvae - Specimen 6 - Tentacle Nerve Series A. - 103 photographs.  
Used for reconstructions.
- 82. Phoronid Larvae - Specimen 6 - Hood Nerve Series B. - 103 photographs.
- 83. Phoronid Larvae - Specimen 6 - Hood Nerve Series A. - 69 photographs.
- 84. Phoronid Larvae - Specimen 5 - Low Power Reference Survey. - 60 photographs.  
These photos are annotated with the negative numbers of the high power shots.
- 85. Phoronid Larvae - Specimen 5 - Medium Power Reference Survey. - 86 photographs.  
These photos are annotated with the negative numbers of the high power shots.

**Box 6**

**Subseries 2: Print Files - Echinoderm Larvae.** - 670 photographs.

- 86. Bipinnaria Larvae - Specimen SF-89 - Pre-Oral Ciliary Band. - 51 photographs.  
*Pisaster ochraceus* survey series, low power.
- 87. Bipinnaria Larvae - Specimen SF-89 - Post-Oral Ciliary Band. - 52 photographs.  
*Pisaster ochraceus* low power survey series; series of oral field sensory cell.
- 88. Bipinnaria Larvae - Specimen SF-89A - Apical Region and Nerves. - 48 photographs.  
Dorsal ganglion series; series through anterodorsal ridges.
- 89. Bipinnaria Larvae - SF-89 Series - Surveys and Miscellaneous Subjects. - 66 photographs.  
Includes miscellaneous low power shots; nerve details, including insertions and apical processes; selected shots of posterolateral lobe, from distal tip to base.
- 90. Auricularia Larvae - Holothuria - Mature Larva Surveys. - 48 photographs.  
*Holothuria mexicana* specimen JAM4 late auricularia.
- 91. Auricularia Larvae - Holothuria - Early Transformation Series. - 43 photographs.  
*Holothuria mexicana* specimen JAM5 early metamorphosis stage.
- 92. Auricularia Larvae - Holothuria - Mid Transformation Series. - 46 photographs.  
*Holothuria mexicana* specimen JAM6.
- 93. Auricularia Larvae - Holothuria - Doliolaria Stage Series. - 45 photographs.  
*Holothuria mexicana* specimen JAM1; includes ciliary band photos, medium power.

94. Auricularia Larvae - Stichopus - Various Survey Photos. - 18 photographs.  
*Stichopus californicus* specimen ST-5: survey of developing embryo; and specimen CU2-90 low power surveys for orientation.
95. Auricularia Larvae - Stichopus - Apical Details and Insertions. - 40 photographs.  
*Stichopus californicus* specimen CU2-90 apical region; pre-oral transverse bands; insertions and other miscellaneous details.
96. Pluteus Larvae - Lytechinus - Rudiment Development at Various Stages. - 67 photographs.  
*Lytechinus pictus* miscellaneous band details; early juvenile rudiment survey series (specimen SU-8A); midstage rudiment series (specimen SU-1B); juvenile urchin (specimen SU-2B).
97. Crinoid Embryos and Larvae - Florometra - Various Subjects. - 60 photographs.  
 Samples of series through gastrulation; samples during elongation phase; series of band formation stages; miscellaneous details.
98. Tornaria Larvae - Balanoglossus - MAP Cell Series. - 49 photographs.
99. Tornaria Larvae - Balanoglossus - Ciliary Band Surveys. - 37 photographs.  
 Specimen T90-1 pre-oral and post-oral band surveys; telotrach; miscellaneous subjects and details.

**Box 7**

**Subseries 3: Print Files - Chordate Embryos and Larvae.** - 253 photographs.

100. Salp Embryos - Thalia - Mature Ganglion Series. - 46 photographs.  
*Thalia democratic* specimen S1.
101. Salp Embryos - Thalia - Early Stage Surveys. - 46 photographs.  
*Thalia democratic* specimens S3 and S4 early neural tube; early stage ganglion series; dorsal ganglion series (intermediate stage); miscellaneous details.
102. Amphioxus Larvae - Specimen AM7 - Various Subjects. - 40 photographs.  
*Branchiostoma floridae* specimen AM7 juvenile - details of transluminal cells, canal, neuropile etc. in anterior cord; selected surveys of rostral and anterodorsal nerve entry; tracking rostral branch.
103. Amphioxus Larvae - Specimen AM7 - Nerve Cord Survey. - 39 photographs.  
*Branchiostoma floridae* specimen AM7 juvenile - survey series of nerve cord;

epithelial sensory cells.

104. Amphioxus Larvae - Various Specimens - Miscellaneous Subjects. - 47 photographs.  
*Branchiostoma floridae* specimen AM 20 neuvula - series through anterior nerve cord; specimen AM 6: young larva - series of Rostrum and anterior nerve cord; specimen AM 3: receptor cell varicosities, dorsal ocellus, etc.
105. Amphioxus Larvae - Specimen AM 4 - Oral Region and Neuropile. - 35 photographs.  
*Branchiostoma floridae* young larva - neuropile details; includes complete set of negatives of the JR junctions in range 0001-0052; survey and details of oral region; oral plexus serial series.

### **Box 8**

Subseries 4: Print files - Müller's Larva and Trochophores. -773 photographs.

106. Polychaete Juvenile - Specimen J2B - Brain Survey. - 49 photographs.  
Spirobranchus juvenile central brain survey.
107. Polychaete Juvenile - Specimen J2B - Eye and Nerve Details. - 52 photographs.
108. Polychaete Juvenile - Specimen J2B - Pharynx Series. - 57 photographs.
109. Polychaete Juvenile - Specimen J2B - Low Power Survey. - 47 photographs.
110. Trochophore Larvae - Specimen B13 - Low Power Survey. - 73 photographs.
111. Trochophore Larvae - Specimen B13 - Various Subjects. - 67 photographs.  
Spirobranchus miscellaneous nerve details; apical organ details; suboral / neurotroch series.
112. Trochophore Larvae - Specimen B13 - Pharynx Series. - 52 photographs.
113. Trochophore Larvae - Specimen S5 - Various Details. - 74 photographs.  
Spirobranchus apical organ series; anus and anal vesicle surveys; metatroch, suboral region and pharynx; miscellaneous prototroch and eye photos.
114. Trochophore Larvae - Specimen S5 - Survey. - 38 photographs.
115. Trochophore Larvae - Miscellaneous. - 47 photographs.  
*Phyllodoce mucosa* - advanced stage; miscellaneous photos of prototroch; details from various larvae: polygordius, phyllodoce, chiton; spirobranchus specimen S6

survey of eye.

116. Trochophore Larvae - Specimen S4 - Survey Photos. - 66 photographs.  
Apical tuft series; low power survey series.

117. Müller's Larva - Specimen M4 - Medium Power Survey Series. - 52 photographs.  
*P. canadensis*.

118. Müller's Larva - Specimen M4 - Suboral Nerve Centres. - 46 photographs.

119. Müller's Larva - Specimen M4 - Survey of Apical Region. - 53 photographs.

Subseries 5: Negatives. - approximately 11613 negatives, 18 prints.

**Box 9**

120. Müller's Larva. - approximately 800 negatives.

Negatives	1250-1289	1870-1929	2100-2159	6140-6159	7140-7149
	1310-1482	1950-1999	2180-2199	6190-6429	11410-11429
	1500-1779	2020-2039	2210-2249	6560-6569	
	1790-1849	2060-2089	3500-3519	6900-6979	

121. Phoronid Ph5. - approximately 1660 negatives.

Negatives	23540-24269	24740-24759	25380-25399	25650-25969	26240-26249
	24320-24549	24890-24999	25410-25439	26080-26099	
	24620-24759	25270-25289	25550-25629	26160-26169	

122. Phoronid and Müller's Larva. - approximately 33 negatives, 4 prints.  
Müller's larva survey views; phoronid low power lateral view, dorsal view, ventral view, apical region, hood margin, suboral ciliary details; prints of stereopairs.

123. Phoronid Ph6. - approximately 700 negatives.

Negatives	26250-26529	26730-26769	27160-27249	29140-29149
	26550-26629	26950-27309	27270-27299	6360-6379
	26640-26719	27050-27149	28070-28089	

124. Spirobranchus S4 (24 Hour). - approximately 620 negatives.

Negatives	2240-2339	2620-2659	3380-3389	5980-6019	6340-6349
	2440-2459	3060-3099	3420-3449	6230-6259	7340-7379
	2490-2539	3130-3179	3580-3599	6270-6279	8190-8239
	2550-2599	3220-3239	3610-3629	6280-6299	10670-10689
					10970-10979

125. Spirobranchus S5 (48 Hour). - approximately 250 negatives.

Negatives	8880-8889	9630-9639	10680-10699	11330-11369
	8930-8949	9950-9969	10980-10989	
	9230-9249	10280-10299	11030-11049	
	9260-9289	10650-10669	11090-11099	

126. Spirobranchus (Metatrochophore) B13. - approximately 920 negatives.

Negatives	7170-7179	7630-7679	8230-8259	9210-9239	10410-10459
	7240-7249	7700-7819	8310-8329	9250-9269	10550-10569
	7350-7459	7830-7889	8880-8889	10120-10199	11040-11049
	7470-7489	7910-8020	8940-8949	10260-10299	11130-11139
	7510-7619	8160-8189	9090-9099	10330-10339	

127. Spirobranchus (Juvenile) J2B. - approximately 420 negatives.

Negatives	13480-13499	13840-13879	14740-14769	16520-16539
	13530-13549	13940-13979	16300-16349	16350-16359
	13560-13589	14070-14099	16400-16419	
	13710-13779	14480-14499	16570-16609	

128. Spirobranchus SEM - approximately 38 negatives.

Spirobranchus lateral view, apical tuft, anal vesicle, anus, posterior view, pharynx, oral region, trochal band; mitravia larva.

129. Spirobranchus S6, S7. - approximately 300 negatives.

Negatives	9490-9769	9980-9999
	9950-9974	10120-11339

130. Prototroch Survey. - approximately 160 negatives.

Negatives	6036-6069	23660-23709	6338-6351	6316-6323
	6350-8989	2080-2219	4230-4249	

131. Holothuria. - approximately 370 negatives.

Negatives	21250-21279	21650-21689	22130-22169
	21300-21329	21700-21719	22250-22289
	21380-21439	21830-21849	22350-22359
	21510-21539	21900-21969	

132. Stichopus Embryos. - approximately 30 negatives.

Negatives	20340-20369
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133. Cucumber Larvae. - approximately 470 negatives.

Negatives	3340-3389	3490-3909
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134. Cucumber Band. - approximately 190 negatives.

Negatives 7000-7079 7200-7309  
Ciliary band negatives A171-A173, A174-A175

135. Starfish. - approximately 560 negatives.

Negatives 30450-30809 32480-32499 32550-32579 32630-32639 32850-32869  
31180-31219 32510-32539 32590-32619 32790-32829

136. Starfish SF89 A/B + Lobe. - approximately 710 negatives.

Negatives 640-659 6350-6359 6540-7009  
3390-3439 6370-6509 A210-A229

137. Sea Urchin. - approximately 390 negatives.

Negatives 630-649 11290-11329 12640-12769 14660-14679 33920-33933  
11120-11129 11350-11369 12840-12859 32630-32669  
11140-11149 11440-11459 13100-13119 32710-32729  
11200-11219 12140-12159 14380-14389 32770-32789  
11240-11259 12410-12429 14590-14619 33010-33019

138. Florometra. - approximately 610 negatives.

Negatives 15080-15099 15610-15629 17420-17449 17630-17659 18240-18259  
15120-15149 16070-16089 17510-17529 17690-17709 18270-18299  
15220-15449 16130-16149 17550-17569 17810-17829 18620-18639  
15510-15539 16180-16199 17610-17619 18150-18189 18790-18819  
  
19060-19089 19240-19259 19430-19459 19510-19529  
19120-19229 19380-19409 19470-19489

139. Tornaria. - approximately 448 negatives.

Negatives 420-639 750-759 7090-7209 A176-A179 A182-277

140. Salp. - approximately 420 negatives.

Negatives 7300-7319 7560-7629 7540-7559 7620-7629  
7380-7389 7740-7749 7970-7979 7710-7799  
7400-7489 7790-7809 7790-7799 7820-7939  
7510-7519 7970-7979 7550-7569

141. AM 20. - approximately 120 negatives.

Negatives 3080-3109 3440-3489 7720-7739 9220-9239

142. AM3. - approximately 42 negatives.  
Selected negatives.

143. AM4. - approximately 312 negatives.

Negatives 9260-9269 9280-9299 9520-9649 9780-9879 0000-0052

144. Amphioxus AM6. - approximately 360 negatives.

Negatives 5960-6299 9250-9269

145. AM7. - approximately 350 negatives.

Negatives 7630-7669 7940-7979 9140-9219 9470-9479 450-489  
7800-7819 8160-8189 9240-9319 9480-9499

146. Various Larvae. - approximately 330 negatives, 14 prints.  
Selected negatives.

#### **Subseries 6: Images Used in Website.**

147. Colour Images of Larvae.

148. SEM Images of Various Larvae.  
Negatives retained by Dr. Lacalli.

149. Micrograph Indexes. - 5 folders.  
Bound volumes: Preface and Polyclads; Echinochordates I (asteroids, holothurians) Echinochordates II (echinoids, crinoids, enteropneusts, chordates); Lophotrochozoa II (phoronids); Lophotrochozoa III (polychaetes). Each volume contains a complete index to the negatives, listed by number; explanatory notes, copies of images, and references to relevant articles. [See Box 7]

**Thurston Lacalli – MG 210 – Addendum.** – 1962-2002 (inclusive). – 40.64 cm of textual records, 4,643 negatives, 135 3x4” negatives, 103 slides, 90 prints.

This accrual has been organized in a manner generally similar to the previous donation, in 4 series:

1. Personal
2. Articles & Conference Presentations
3. EM Images and Negatives
  - .1 General
  - .2 3D Reconstruction
4. Video.

Permission is granted to the University of Saskatchewan for use of images for any non-commercial academic purpose (teaching or research), including electronic reproduction on websites. T.C. Lacalli must be contacted for permission for commercial use. For all use, proper credit must be given; please consult archivist.

Donated to the University Archives by Dr. T.C. Lacalli; in various accessions between 2002 and 2006.

**1. Personal**

1. Amphioxus Project Correspondence. – 1988-2002.  
See also below, EM Images and Negatives.
2. Correspondence Relating to US Draft and Cambridge Scholarship. – 1968-1972.
3. Field sites and Colleagues. – 103 negatives.
4. General Correspondence (Colleagues). – nd, 1973-2001.
5. PhD. – 1969-1973. – 1,760 negatives.  
See also above, PhD notebooks.
  - .1 Assorted Subjects. – 107 negatives.  
Includes some images of Lacalli and M. McNey.
  - .2 Irradiated Cells. – 621 negatives.  
Listed by number.
  - .3 Laser Irradiation. – 254 negatives.
  - .4 *M. radiata*, *M. rotata*, *M. thomasiana*. – 201 negatives.  
Showing normal development; irradiated cells; laser irradiation; and incomplete development.
  - .5 Plasmolysis. – 159 negatives.
  - .6 Scanning (SEM Images). – 117 negatives.
  - .7 Various. – 301  
Includes cell development; illustrations and diagrams; profiles; isthmus sections; acid effects; temperature effects; autoradiograms.
6. Student Essays. – 1962-1970.

**2. Published Articles, Conference Presentations, Notebooks, etc.**

1. Acta Zoological Papers. – 2002.  
Correspondence and notes related to, together with final versions of, “Sensory pathways in amphioxus larvae I. Constituent fibres of the rostral and anterodorsal nerves, their targets and evolutionary significance;” “Anterior neural centres in echinoderm bipinnaria and auricularia larvae: cell types and organization;” “Floor plate, glia and other support cells in the anterior nerve cord of amphioxus larvae.”
2. Figures.

3. Invited Papers. – 2000-2001.

Correspondence related to, and final versions of, “New perspectives on the evolution of protochordate sensory and locomotory systems, and the origin of brains and heads” (2001) and “Vetulicolians – are they deuterostomes? Chordates?” (2002).

4. Notebooks - Conferences. – 1987 - 1996.

Includes notebooks on American Society of Zoologists Annual Meeting (1992, 1993, 1996); 11<sup>th</sup> Congress, International Society of Developmental Biologists (1989); International Echinoderm Conference (1987); N.W. Developmental Biology Conference (1989); the Gordon Conference on Biomathematics and Theoretical Biology ((1992); NATO workshop on biological pattern formation (1992); as well as notes relating to sabbatical; visit to the University of Regina (P. Prushinkiewicz).

5. Notebooks - Ideas. – 1986-1994.

Larval work in progress.

6. Notebooks - Larval and EM Observations. - 1006

7. Notebooks - Observations. – 1984-1989.

8. Notebooks - Sabbatical – 1990-1991.

Book 1: Tomaria field notes;  
Book 2: amphioxus field notes.

9. Notebooks - Sabbatical – Victoria and Bamfield. – 1983-1986.

**Box 12**

10. Personnel. – 1985-1995, 1999. – 26 negatives, 1 print.

Includes images of Thurston Lacalli; Mr. Xiachu; Samantha Kelly; David Zhang; Jenifer West; T.H.J. Gilmour; Lionel Harrison; Michael Lyone.

11. Sample Teaching Materials. – 1976-2001.

Includes class outlines and sample exams for Biol 110, 352, 463. Also includes material provided during the search committee process for hiring in developmental biology (the position given to Lacalli).

12. Selected Reviews of Manuscripts. – 1976-2001.

### **3. EM Images and Negatives**

#### **.1 General**

1. Amphioxus Serial EM Series – Master Negatives Index.  
Specimens AM 3 and AM 4.

2. Amphioxus – Head Survey – Print Series. – 67 photographs, textual records.

7531 (157)	7426 (1339)	9650 (2379)	9640 (none)
7530 (214)	7427 (1402)	9642 (2319)	9635 (none)
7529 (250)	7428 (1473)	7333 (2410)	9643 (none)
7528 (300)	7430 (1550)	9597 (2445)	9644 (none)
7527 (357)	7356 (1614)	7327 (2476)	7325 (none)
7526 (471)	7355 (1694)	7370 (2552)	7376 (none)
7525 (none)	7351 (1758)	7366 (2608)	9380 (none)
7524 (629)	7350 (1841)	7365 (2670)	7322 (none)
7522 (714)	1249 (1895)	7362 (2752)	9639 (none)
7521 (none)	7348 (1913)	7372 (2822)	9637 (none)
7520 (936)	7347 (1977)	7396 (2870)	7346 (none)
7519 (1007)	7345 (2052)	7373 (2887)	7336 (none)
7532 (1057)	7344 (2113)	4879 (2901)	7335 (none)
7425 (1111)	9634 (2201)	7374 (2946)	4457 (none)
7534 (1129)	7324 (2230)	7375 (3005)	4602 (none)
7424 (1181)	7338 (2296)	5021 (3032)	9384 (none)
7422 (1263)	7323 (2359)	7377 (3067)	

3. Amphioxus – Head Survey – Print Series. – ~ 123 – 3x4” negatives. – 2 folders.  
AM 4, AM 6, AM7; especially preoral organ, club-shaped gland, endostyle.

#### **Folder 1:**

AM4 – Highpower of JR junction: 0036; 0032; 0042; 0027; 0023; 0022;0020;0004

AM4 – misc. head structure, club-shaped gland: 0065; 9382; 0043; 9380; 9381; 0066; 0074;  
0044; 0076

AM4 – misc. head structures, pre-oral organ: 0085; 0084; 0086; 9638; 9640; 9643; 9648; 9650;  
9635; 9639; 9637; 9645; 9652; 0082; 0081; 0079; 0078

AM4/AM6 – misc. head structures (various): 9843; 9789; 9530; 9815; 9613; 9836; 9551; 9606;  
9844; 9544; 9387; 9856; 9385; 9876; 9875; 9386; 9868; 9535; 0484; 9831; 9824; 9598; 9830;  
9823; 9826; 9651; 0486; 7349; 9597; 6216; 6274; 6276;9258;9255; 6163

#### **Folder 2:**

AM7 – (post-metamorphosis) nerve cord: 7648; 7818; 7950; 7640; 7642; 7638; 7639;7662;  
7661; 7954; 7951; 7808; 8169; 9486; 9481;

Am7 – (post-metamorphosis) rostral nerve details: 9253; 9297; 9207; 9213; 9161; 0477; 7943; 9247; 9252; 7946; 0470; 0464; 0456; 0483

Am3 – (8d specimen, fixation issues): 33030; 33015; 33298; 33295; 31970; 31911; 31868; 30099; 28275; 28264; 28424

Am7 – (post-metamorphosis) details of epithelial sensory cells: 9177; 9209; 9196; 9274; 9206; 9179; 9279; 9280

AM4 – misc. head structures, endostyle: 9610; 9591; 9589; 9545; 9567; 9628; 9573; 9584; 9585; 9570; 7340; 7341; 9630; 9549; 9627

4. Digital Images. – 2 – 100 MB zip discs, textual records, 2 prints.

Colour jpgs, reference copy prints of all images.

See also <http://scaa.usask.ca/gallery/lacalli/>

5. Echinoderm larvae; Tornaria larvae. – 1990, 1999. - ~160 negatives, 6 -10x8mm negatives, textual records.

Echinoderm: light micrographs of live larvae from culture. These were raised by Dr. Gilmour.

Tornaria larvae: initially filmed in Florida.

6. *Pisaster ochraceus* (starfish) larvae. – 1995. - ~186 negatives, 6 – 10x8mm negatives.

Showing epithelial musculature - as fibre tracts, in osmium – stained whole mounts. Several are made into montages.

7. Polychaete trochophores. - ~134 negatives.

Light micrographs of cultured larvae through development and feeding experiments using Aquadaq particles. Additionally sections and whole mount preparations of *Phyllodoce* larvae show various neural cells and structures – selected examples.

8. SEM Images of various larvae. – 23 prints.

See also above, “Digital Images.”

9. *Stichopus californicus* – (Sea cucumber) metamorphosis. – 1991. - ~207 negatives, 1 contact sheet.

Light microscope images of osmium-fixed specimens from late-stage larvae through metamorphosis to the doliolaria stage. These are EM fixed and stained to show the ciliary band rearrangements more clearly.

## **.2 3D Reconstruction:**

1. *Amphioxus* – Frontal eye / Dk. Blue. – [23 February 1995]. – 34 slides.

2. Amphioxus – [AM 3, AM 4] - Frontal Eye. – 28 slides.
3. Salp, Echinoderm larvae; Müller's larva. – [23 February 1995]. – 32 slides.
4. Müller's larva. – 9 slides.
5. Various 3D Reconstructions. - ~333 negatives.  
Positive and negative images of 3D glass plate reconstructions of various larvae, including Müller's larvae; Pilidium; Actinotroch; Trochiphore; Crinoid embryos.

#### **4. Video**

1. Tapes. – 5 video Hi8 tapes.  
Dubs from Beta; done by Tom Gilmour and Thurston Lacalli. Larval behavior through the microscope. They include:
  1. 8-9 August 1990. Tornaria feeding and reversals; Müller's larva and pilidium.
  2. August 1994 (dubbed Oct 1998). Tom Gilmour tape of amphioxus feeding.
  3. September 1996. Starfish larvae: individuals swimming; groups; pile up: twisting and turning; crumple response.
  4. Cultured larvae of various stages swimming. From September 1991 cultures of *Bran. floridae* raised in Saskatoon.
  5. September 1994. Starfish larvae: low light sequence; high light sequence; spiraling (see 24:50-30:00).