

11. Appendix

12.1 Appendix to Chapter 7

Table A1 Antimicrobial activities of different concentrations of EEP (% w/v) from different geographic origins against bacteria and a yeast displayed by the mean diameter of the inhibition zone (mm). n = 3, l.g. stands for lawn of bacterial growth due to stimulation by the effect known as hormesis.

<i>E. coli</i>					<i>B. brevis</i>				
Propolis type	Inhibition Diameter				Propolis typ	Inhibition Diameter			
	0.1%	1.0%	10.0 %			0.01%	0.1%	1.0%	10.0 %
WEP	0.00	0.00	0.00		WEP	0.00	0.00	3.61	9.30
I1	0.00	3.40	5.50		I1	1.63	9.12	13.87	18.07
E1	0.00	0.00	0.00		E1	5.77	8.30	15.57	23.40
C1	0.00	0.00	0.00		C1	0.00	9.83	12.37	22.47
K1	1.97	13.53	16.57		K1	4.43	16.80	29.43	31.18
G1	0.00	3.40	6.83		G1	3.30	9.12	13.87	20.40
RUS1	0.00	0.00	24.00		RUS1	4.43	11.13	17.80	18.30
P1	3.07	8.57	11.67		P1	4.30	12.57	18.80	24.13
P2	1.73	2.80	5.80		P2	3.60	10.00	16.83	23.50
P3	2.33	7.10	10.07		P3	0.00	11.30	17.23	21.50
P4	2.37	6.10	10.80		P4	0.00	11.60	19.13	25.10
SA1	1.63	2.47	5.67		SA1	9.00	15.03	20.47	22.90
SA3	0.00	0.00	6.87		SA3	3.07	13.80	20.40	24.60
SA5	0.00	5.77	5.80		SA5	8.90	14.57	18.33	24.63
SA6	0.00	0.00	4.40		SA6	9.50	14.23	21.20	24.40
SA8	0.00	2.13	4.70		SA8	9.80	13.50	23.33	28.33
SA11	0.00	2.50	6.77		SA11	5.67	10.83	20.40	26.03

<i>M. lutes</i>					<i>B. megaterium</i>				
Propolis typ	Inhibition Diameter				Propolis typ	Inhibition Diameter			
	0.01%	0.1%	1.0%	10.0 %		0.01%	0.1%	1.0%	10.0 %
WEP	0.00	0.00	0.00	5.67	WEP	0.00	0.00	0.00	3.60
I1	0.00	3.43	7.60	11.33	I1	2.07	4.97	8.07	10.77
E1	0.00	0.00	0.00	8.87	E1	0.00	5.27	10.53	12.93
C1	0.00	0.00	6.20	10.27	C1	0.00	4.77	12.67	12.07
K1	0.00	3.43	7.00	11.00	K1	0.61	6.40	15.40	16.30
G1	0.00	6.83	15.90	16.77	G1	2.27	4.63	8.07	10.43
RUS1	0.00	9.37	7.97	11.34	RUS1	2.50	8.47	8.57	11.40
P1	0.00	4.87	11.23	12.70	P1	2.03	6.10	10.20	12.97
P2	0.00	0.00	9.03	10.13	P2	1.63	5.87	10.67	15.43
P3	0.00	4.63	10.87	11.80	P3	2.37	7.43	11.30	12.07
P4	0.00	5.17	10.20	13.40	P4	2.23	7.17	16.17	15.50
SA1	0.00	10.23	17.13	17.00	SA1	3.23	11.40	21.83	18.33
SA3	0.00	6.33	11.53	17.33	SA3	0.00	6.50	11.33	16.20
SA5	4.50	11.57	15.43	18.87	SA5	5.17	10.87	14.83	19.00
SA6	4.50	10.73	13.43	19.47	SA6	3.50	11.03	13.77	17.70
SA8	0.00	7.73	14.70	18.80	SA8	3.17	11.43	14.47	20.07
SA11	0.00	3.20	11.43	18.67	SA11	0.00	7.40	17.17	22.00

Table A1 contd.***B. subtilis***

Propolis typ	Inhibition Diameter			
	0.01%	0.1%	1.0%	10.0 %
WEP	0.00	0.00	0.00	7.87
I1	0.00	5.77	11.73	16.93
E1	0.00	6.87	11.30	16.87
C1	0.00	6.23	16.13	18.03
K1	0.00	7.73	18.60	25.97
G1	0.00	5.77	11.73	14.47
RUS1	0.00	9.20	10.93	15.60
P1	0.00	8.35	13.23	18.00
P2	0.00	6.20	9.47	15.13
P3	0.00	8.80	11.83	16.50
P4	0.00	7.67	14.80	15.67
SA1	4.60	12.30	18.07	28.67
SA3	0.00	7.43	13.30	16.70
SA5	4.90	11.03	17.20	21.40
SA6	5.00	11.10	15.33	21.67
SA8	3.60	9.53	18.67	22.00
SA11	0.00	6.03	11.50	18.63

S. cerevisiae

Propolis typ	Inhibition Diameter			
	0.01%	0.1%	1.0%	10.0 %
WEP	0.00	0.00	0.00	5.67
I1	0.00	3.00	11.87	21.37
E1	0.00	0.00	5.37	6.93
C1	0.00	2.23	3.87	5.60
K1	0.00	16.37	33.67	50.67
G1	0.00	3.00	13.57	25.37
RUS1	0.00	0.00	6.77	15.67
P1	0.00	9.60	24.53	39.60
P2	0.00	0.00	13.90	36.00
P3	0.00	9.43	17.83	52.67
P4	0.00	4.50	22.77	44.13
SA1	0.00	3.60	6.47	23.97
SA3	0.00	0.00	3.20	7.20
SA5	0.00	8.20	21.77	23.90
SA6	0.00	7.07	13.00	23.70
SA8	1.50	6.33	12.47	25.53
SA11	0.00	0.00	13.43	22.13

P. syringae

Propolis typ	Inhibition Diameter				
	0.001%	0.01%	0.1%	1.0%	10.0 %
WEP	0.00	0.00	0.00	0.00	7.87
I1	0.00	0.00	5.00	9.33	13.00
E1	l.g	l.g	4.1 + l.g.	11.60	13.33
C1	0.00	l.g	3.7 + l.g.	9.70	12.00
K1	l.g	l.g	4.6 + l.g.	21.60	22.33
G1	l.g	l.g	l.g	10.67	15.00
RUS1	0.00	0.00	8.80	12.67	16.33
P1	l.g	l.g	5.8 + l.g.	15.57	19.00
P2	0.00	l.g	l.g	10.17	13.67
P3	0.00	l.g	3.3 + l.g.	12.20	15.00
P4	0.00	l.g	4.10	15.53	20.00
SA1	l.g	4.8 + l.g.	17.80	22.60	27.67
SA3	l.g	l.g	4.3 + l.g.	10.50	16.00
SA5	l.g	7.0 + l.g.	17.50	24.28	25.67
SA6	0.00	0.00	0.00	0.00	0.00
SA8	l.g	3.3 + l.g.	10.43	20.60	27.33
SA11	0.00	l.g	6.4 + l.g.	17.88	27.33

Table A2 Antifungal activities of different concentrations of EEP (% w/v) from different geographic origins as displayed by the mean diameter of the inhibition zone (mm). n = 3.

A. niger

Propolis type	Inhibition Diameter				
	1%	2%	4%	8%	10%
WEP	0.00	0.00	0.00	0.00	0.00
I1	3.50	7.67	6.67	10.33	12.67
E1	0.00	0.00	5.33	8.67	8.67
C1	4.00	7.00	7.00	7.67	8.00
K1	8.00	15.33	13.00	13.00	13.00
G1	0.00	7.67	6.67	10.33	11.67
RUS1	3.50	6.00	7.33	9.00	9.33
P1	2.50	7.00	9.33	9.33	12.33
P2	3.00	8.00	12.00	11.33	14.67
P3	3.30	8.33	9.00	10.67	11.00
P4	4.50	12.67	14.00	13.00	12.00
SA1	2.90	6.33	6.67	8.33	9.33
SA3	1.50	4.33	5.00	6.00	7.67
SA5	4.00	7.00	11.33	11.00	11.00
SA6	2.50	5.67	8.00	7.00	8.67
SA8	3.50	6.33	6.33	6.00	6.67
SA11	2.90	5.67	6.00	6.00	5.67

P. chrysogenum

Propolis type	Inhibition Diameter				
	1%	2%	4%	8%	10%
WEP	0.00	0.00	0.00	0.00	0.00
I1	3.00	7.67	10.67	12.33	11.00
E1	2.50	8.00	6.00	7.00	7.67
C1	0.00	5.00	5.00	6.33	7.00
K1	7.50	12.00	14.33	12.67	16.33
G1	0.00	7.67	10.67	12.33	11.00
RUS1	0.00	3.00	6.00	7.33	8.33
P1	3.30	8.33	11.00	12.00	13.67
P2	7.00	11.67	12.00	13.00	14.00
P3	6.00	11.00	13.00	15.33	18.67
P4	5.70	10.67	13.67	12.00	12.33
SA1	2.00	5.00	8.00	9.00	10.67
SA3	3.10	8.00	8.00	8.33	8.67
SA5	2.60	6.67	7.00	8.33	12.00
SA6	1.50	6.00	6.00	6.00	10.00
SA8	3.90	7.33	7.67	6.67	7.00
SA11	0.00	3.00	3.67	5.00	4.67

Table A2 Contd.

<i>T. viridae</i>					
Propolis type	Inhibition Diameter				
	1%	2%	4%	8%	10%
WEP	0.00	0.00	0.00	0.00	0.00
I1	3.50	7.67	8.67	8.00	10.00
E1	0.00	0.00	0.00	0.00	0.00
C1	0.00	0.00	0.00	0.00	0.00
K1	5.10	12.67	17.00	14.33	14.33
G1	2.50	7.67	8.67	8.00	16.00
RUS1	0.00	4.67	6.00	8.33	8.67
P1	3.00	9.00	16.67	17.67	19.33
P2	4.00	8.00	10.00	12.67	12.00
P3	6.00	10.67	11.00	14.00	13.00
P4	7.50	11.33	11.00	9.67	12.67
SA1	0.00	0.00	0.00	0.00	0.00
SA3	0.00	0.00	0.00	0.00	0.00
SA5	0.00	0.00	0.00	0.00	3.33
SA6	0.00	0.00	0.00	0.00	0.00
SA8	0.00	3.33	6.00	5.33	6.00
SA11	0.00	3.33	4.00	5.33	6.67

Table A3 Antimicrobial activities of the volatile components of propolis (PV)

Activities of propolis from different geographic origins demonstrated by the mean inhibition diameter (mm) of a 10% (w/v) PV. n = 3.

	E1	C1	G1	P1	P2	SA1	SA3	SA5	I1
<i>B. brevis</i>	20.15	19.53	18.55	21.11	19.57	18.78	21.82	20.19	19.42
<i>B. megaterium</i>	9.22	10.86	9.51	11.23	13.56	16.43	14.32	15.87	11.32
<i>B. subtilis</i>	14.33	15.32	12.76	15.01	15.11	25.86	14.76	18.55	16.45
<i>M. luteus</i>	6.56	8.59	16.22	11.60	9.15	16.45	15.55	16.67	13.24
<i>E. coli</i>	n.d.	n.d.	5.93	10.65	5.23	4.44	5.81	5.12	8.67
<i>P. syringae</i>	10.45	11.52	13.25	16.77	11.25	24.45	14.39	22.35	13.45
<i>S. cerevisiae</i>	5.76	5.12	20.57	35.42	31.34	21.95	7.11	20.58	6.48
<i>A. niger</i>	11.52	10.25	10.34	9.55	10.17	10.23	7.67	5.67	11.25
<i>P. chrysogenum</i>	15.11	9.53	11.54	15.64	10.11	9.95	9.12	5.58	9.35
<i>T. viridae</i>	12.54	13.35	17.67	11.56	12.35	2.85	n.d.	5.00	13.86

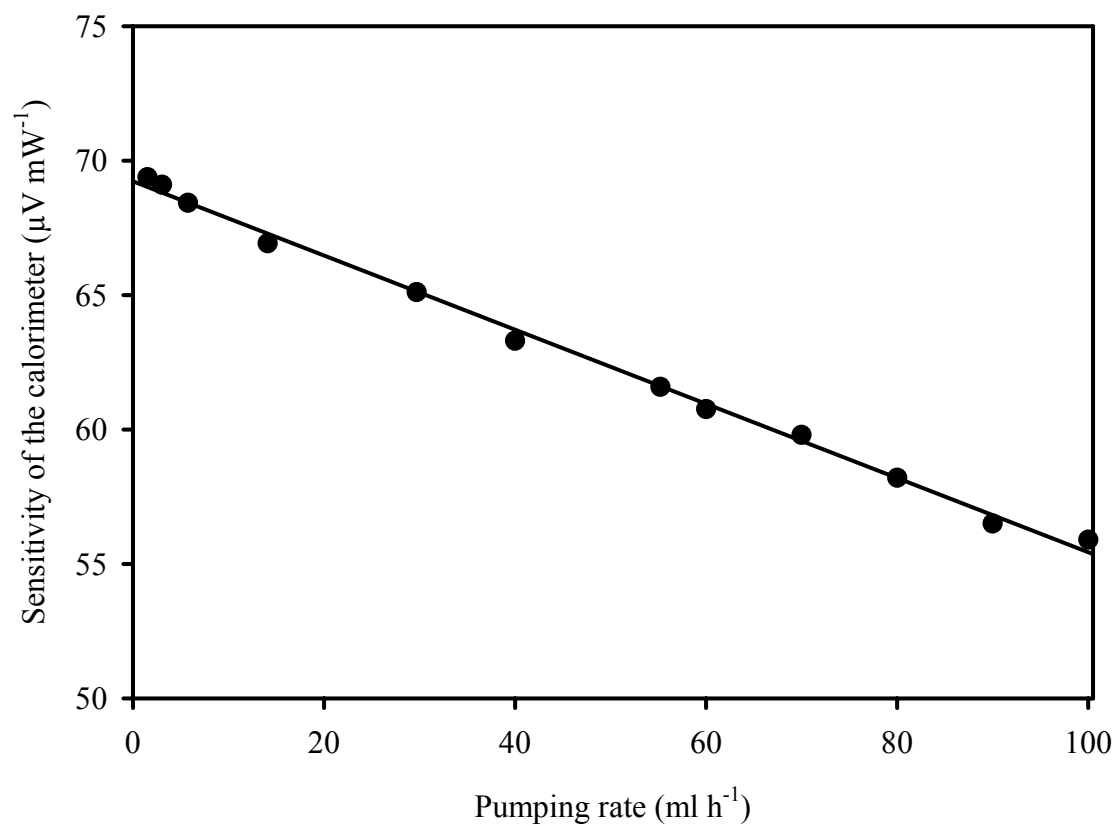


Fig. A1 Electrical calibration of the flow calorimeter (10700-1, LKB Bromma, Sweden) whilst circulating a phosphate buffer of pH 7.0 at different pumping rates and at a temperature of 30 °C.

12.2. Acknowledgments

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12.3 Personal Data

Assegid Garedeu, born on 01.05. 1969, in Northern Showa, Ethiopia.

Education and qualifications

- Sept.1983 – Mar.1987 **High school** attended at Hailemariam Mammo Comprehensive Secondary School, Debrebirhan and Completed with distinction
- Sept.1987 - Dec.1991 Undergraduate study at Addis Ababa University, Faculty of Natural Science. Earned a **B.Sc. Degree in Biology** with distinction and awarded the University gold medal upon graduation being the outstanding student of the year.
- Sept.1993 - July 1996 Graduate Study at the School of graduate studies, Addis Ababa University Earned a **M.Sc. Degree in Biology** with distinction and Awarded the "Ethiopian Scientific Society (ESS) - Student Academic Excellence Award" of the year 1995.
- Apr. – Oct. 1995 Conducted research in the Institute for Biophysics, Free University of Berlin, as part of my M.Sc. thesis.
- Apr. 2000 – Nov.2003 **Ph.D study** at the Faculty of Biology, Chemistry, and Pharmacy, Institute of Zoology, Free University of Berlin, Germany.

Professional experience

- | | |
|----------------------------|--|
| March 1992 - June 1993 | Graduate Assistant at the Bahir Dar Teachers College, involved in teaching different Biology courses for diploma students. |
| July 1993 - Sept. 1996 | Assistant Lecturer at the Bahir Dar Teachers College, involved in teaching different Biology courses for diploma students. |
| Oct. 1996 – September 1999 | Lecturer at the Bahir Dar University, involved in teaching different Biology courses for undergraduate students and conducting research. |

12.4 List of own publications

- Assegid Garedew, Ingolf Lamprecht, Erik Schmolz, Burkhard Schricker (2002) The varroacidal action of propolis: a laboratory assay. *Apidologie* 33, 41-50.
- Assegid Garedew, Erik Schmolz, Burkhard Schricker, Ingolf Lamprecht (2002) Microcalorimetric investigation of the action of propolis on *Varroa destructor* mites. *Thermochimica Acta* 382, 211-220.
- Assegid Garedew, Erik Schmolz, Ingolf Lamprecht (2003) Microcalorimetric and respirometric investigation of the effect of temperature on the antivarroa action of Propolis. *Thermochimica Acta* 399, 171–180.
- Assegid Garedew, Erik Schmolz, Burkhard Schricker, Benedikt Polaczek, Ingolf Lamprecht (2002) Energy metabolism of *Varroa destructor* mites and its implication on host vigour. *J. Apicult. Sci.* 46, 73-83.
- Assegid Garedew, Erik Schmolz, Burkhard Schricker, Ingolf Lamprecht –The energy and nutritional demand of the parasitic life of the mite *Varroa destructor*. (in press: *Apidologie*).
- Assegid Garedew, Ingolf Lamprecht, Erik Schmolz, Burkhard Schricker (2002) Microcalorimetric toxicity investigation of propolis on *Tenebrio molitor* L. (Coleoptera: Tenebrionidae). *Thermochimica Acta*, 394, 239-245.
- Assegid Garedew, Erik Schmolz, Ingolf Lamprecht (2003) The antimicrobial activity of honey of the stingless bee *Trigona spp* and the implication of its use as a panacea. *J. Apicult. Sci.* 47, 37-49.
- Assegid Garedew and I. Lamprecht (1997) Microcalorimetric investigations on the influence of propolis on the bacterium *Micrococcus luteus*. *Thermochimica Acta* 290, 155-166.
- Assegid Garedew, Erik Schmolz, Ingolf Lamprecht, The effect of propolis on the metabolic rate and metamorphosis of the greater wax moth *Galleria mellonella* (accepted: *Thermochimica Acta*).
- Assegid Garedew, Erik Schmolz, Ingolf Lamprecht, Microcalorimetric investigation on the antimicrobial activity of honey of the stingless bee *Trigona spp.* and comparison of some parameters with those obtained with standard methods (in press: *Thermochimica Acta*).
- Alexandra Torres, Assegid Garedew, Erik Schmolz, Ingolf Lamprecht, Calorimetric investigation of the antimicrobial action and insight into the chemical properties of “angelita” honey – a product of the stingless bee *Tetragonisca angustula* from Colombia. (in press: *Thermochimica Acta*).
- Claudia Contzen, Assegid Garedew, Ingolf Lamprecht, Erik Schmolz, Calorimetric and biochemical investigations on the influence of the parasitic mite *Varroa destructor* on the development of honeybee brood. (in press: *Thermochimica Acta*).
- Assegid Garedew, Erik Schmolz, Ingolf Lamprecht, Microcalorimetric and microbiological investigations on the antimicrobial actions of Kazakh mumiyo. (submitted: *J. Ethnopharm.*).

- Assegid Garedew, Michael Feist, Erik Schmolz, Ingolf Lamprecht, Thermal analysis of mumiyo, the legendary folk remedy from the Himalaya region. (Accepted: *Thermochimica Acta*).
- Assegid Garedew, Erik Schmolz, Ingolf Lamprecht, Microbiological and calorimetric studies on the antimicrobial actions of different extracts of propolis: an *in vitro* investigation. (Submitted: *Thermochimica Acta*).
- Assegid Garedew, Alexandra Torres, Erik Schmolz, Ingolf Lamprecht, Comparative microcalorimetric and antimicrobial investigations of different stingless bee honeys and elucidation of the unique chemical nature responsible for their biological activity. (Submitted: *Thermochimica Acta*).
- Assegid Garedew, Erik Schmolz, Ingolf Lamprecht, Comparative investigations of the antivarroa actions of propolis from different geographic origins. (in preparation).
- Assegid Garedew, Erik Schmolz, Burkhard Schricker, Benedikt Polaczek, Ingolf Lamprecht (2002) The effect of temperature on the antivarroa action of propolis. (Abstract of conference proceeding), *Apidologie* 33, 478-480.
- Erik Schmolz and Assegid Garedew (2002) The energetics of *Varroa destructor* on honeybee development. (Abstract of conference proceeding), *Apidologie* 33, 481-482.
- Claudia Contzen, Assegid Garedew, Erik Schmolz, The influence of Varroa mites on energy content, hemolymph volume and protein concentration of bee pupae. (Abstract of conference proceeding), in Press: *Apidologie*.
- Assegid Garedew, The effect of propolis on larval development and pupal metamorphosis of *Galleria mellonella*. (Abstract of conference proceeding), in Press: *Apidologie*.
- Assegid Garedew (2003) Nicht essbar aber heilsam: in Äthiopien dient Honig von Stachellosebienen als Medizin. *Deutsches Bienenjournal*, October, 20-21.

12.5 Declaration (Erklärung)

Ich versichere, dass ich diese Arbeit selbstständig angefertigt, nur die angegebenen Hilfsmittel verwendet und noch nicht für Examenszwecke benutzt habe.

September 22, 2003, Berlin

Assegid Garedew