

# The 10<sup>th</sup> International Workshop on the Mechanics of Hearing

*Keele University, United Kingdom*

## Programme

July 26 – Aug 1, 2008

	7:30-9:00	9:00-10:30	10:30-11:00	11:00-12:30	12:30-1:30	1:30-3:00	3:00-4:00	4:00-4:30	4:30-6:00	7:00-11:00
Saturday, July 26						Reception (collect registration packs, setup talks and posters)				Welcome Get-Together
Sunday, July 27	Break -fast	Talks #1-3	Coffee break	Talks #4-6	Lunch	Posters	Plenary #1	Tea break	Talks #7-9	Dinner & team building
Monday, July 28	Break -fast	Talks #10-12	Coffee break	Talks #13-15	Lunch	Posters	Plenary #2	Tea break	Talks #16-18	Dinner & discussion
Tuesday, July 29	Break -fast	Talks #19-21	Coffee break	Talks #22-24	Excursion to <a href="#">Chester</a> / <a href="#">Delamere Forest</a> (includes packed lunch)				Banquet at <a href="#">Crewe Hall</a>	
Wednesday, July 30	Break -fast	Talks #25-27	Coffee break	Talks #28-30	Lunch	Posters	Plenary #3	Tea break	Talks #31-33	Dinner
Thursday, July 31	Break -fast	Talks #34-36	Coffee break	Talks #37-39	Lunch	Posters	Business meeting / Open Discussion (+ tea-break)		Farewell Dinner & Ceilidh	
Friday, August 1	Break -fast	Departure								

Key to venues :	Medical School	Keele Hall	Comus Restaurant
			Hawthorns restaurant

Sponsored by:

		
		

## Welcome, Acknowledgements, and Friendly Faces?

Welcome to the 10<sup>th</sup> International Workshop on the Mechanics of Hearing. We hope that you enjoy your stay in Keele, and get the most of this once-every-three-years opportunity to advance our understanding of the mechanics of hearing.

The workshop is being sponsored entirely by outside companies and organisations with direct interests in the field. The organisers are particularly grateful for the financial support provide by:

Otodynamics Ltd – [www.otodynamics.com](http://www.otodynamics.com)  
Polytec GmbH – [www.polytec.com](http://www.polytec.com)  
The Oticon Foundation – [www.oticon.com](http://www.oticon.com)  
MED-EL – [www.medel.com](http://www.medel.com)  
Starkey Labs – [www.starkey.co.uk](http://www.starkey.co.uk)  
and  
Tucker-Davies Technologies – [www.tdt.com](http://www.tdt.com)

The workshop is being organised by Nigel Cooper and David Kemp, but there are a large number of other people involved in running it, chief among whom are:

Janet Norton– registration desk  
Ron Knapper – technical support (presentations, etc)  
Rob Wust (accompanying persons programme)  
Mike Evans & Dave Furness (general help – Keele residents!)  
Chris Bergevin (MoH-101 discussion session)  
and  
Chris Shera & David Mountain (open discussion session)

Please feel free to ask any of the team for help and advice if you have any problems or questions.

Many thanks – Nigel, David, and the rest of the team.

## Programme

### Saturday, July 26

13:30-18:00	Registration and room check-in.	<i>Medical School Foyer</i>
	Poster room set-up	<i>Medical School Rooms 1.35-1.38</i>
	Talk set up for presentations on Sunday	<i>MS Lecture Theatre 1</i>
19:00	Welcome get-together drinks reception from 7pm, food from 7:30-9pm	<i>Comus Restaurant / Le Café Bar</i>

## Sunday, July 27

8:50 Cooper & Kemp. *Welcome, introduction & acknowledgements.*

### **Session 1: BM / ooC / wave measurements**

**Chairs: Nuttall & Dong**

9:00 Mellado Lagarde, Drexl, Lukashkina, Lukashkin & Russell. *Determining the identity of the cochlear amplifier: electrical stimulation of the tecta mouse cochlea.*

9:30 Ren & He. *Differential measurement of basilar membrane vibration in sensitive gerbil cochlea.*

10:00 Fridberger & Jacob. *Amplification in the cochlear apex.*

10:30 Coffee break

### **Session 2: more BM / ooC / wave measurements**

**Chair: Ruggero**

11:00 Chen, Zheng, Choudhury, Jacques & Nuttall. *Organ of corti micromechanics with local electrical stimulation.*

11:30 Lukashkin, Lukashkina, Richardson & Russell. *Does the cochlea compromise on sensitivity and frequency selectivity?*

12:00 Dong & Olson. *The role of compression and traveling wave pressures in the transmission of sound out of the gerbil cochlea.*

12:30 Lunch *Comus Restaurant (in the Chancellor's Building)*

### **Session 3: Posters (13:30-15:00)**

### **Session 4: Plenary – Sound processing in the cochlea**

**Chair: Kemp**

15:00 Jont Allen. *The role of the cochlea in human speech recognition.*

16:00 Tea break

### **Session 5: BM / ooC / wave models**

**Chairs: Olson & Böhnke**

16:30 de Boer & Nuttall. *Obvious and 'hidden' waves in the cochlea.*

17:00 Frosch. *DP phases in mammalian cochleae, predicted from liquid-surface-wave formulas.*

17:30 Zhang & Mountain. *Distortion product emissions: where do they come from?*

19:00 Dinner & team building (games) *Keele Hall Restaurant*

## Monday, July 28

### Session 1: more wave models

**Chairs** Duifhuis & Bergevin

- 9:00 **Neely** & Liu. *Retrograde propagation of cochlear distortion.*  
9:30 **Elliott**, Ku & Lineton. *Time domain model of a nonlinear inhomogeneous cochlea.*  
10:00 **Sisto** & Moleti. *Cochlear reflectivity and TEOAE transfer function.*  
10:30 Coffee break

### Session 2: Otoacoustic emission measurements

**Chair:** Guinan

- 11:00 **Kemp**. *Slow oscillatory adaptation to brief over-stimulation and the dynamics of cochlear homeostasis.*  
11:30 **Bian**. *Amplitude and frequency modulations of spontaneous otoacoustic emissions.*  
12:00 **van Dijk** & Manley. *The effect of ear canal pressure on spontaneous otoacoustic emissions: comparison between human and lizard ears.*  
12:30 Lunch *Medical School foyer & student's common room*

### Session 3: Posters (13:30-15:00)

### Session 4: Plenary – Somatic motility

**Chair:** Evans

- 15:00 **Joe Santos-Sacchi**. *Firing up the amplifier: IR laser induced temperature jump effects on OHC motor gating currents and NLC.*  
16:00 Tea break

### Session 5: Prestin

**Chairs:** Ashmore & Hallworth

- 16:30 Sun, Farrell, Chana, Feng, Oster, Brownell & **Spector**. *Voltage and frequency dependence of charge transfer by prestin: an electro-diffusion model.*  
17:00 **Wada**, Murakoshi, Iida & Kumano. *Topological characterization by atomic force microscopy of prestin in the plasma membrane of prestin-transfected chinese hamster ovary cells using quantum dots.*  
17:30 Rajagopalan, Sfondouris, Oghalai, Pereira & **Brownell**. *Membrane composition tunes the outer hair cell motor.*  
19:00 Dinner *Comus Restaurant (in the Chancellor's Building)*  
20:00 **Bergevin** et al., **MoH-101 session** :After dinner back-to-basics (open discussion)  
*Chancellor's Building rm CBA1.103*

## Tuesday, July 29

### **Session 1: Electrophysiological models and measurements**

**Chair: Brownell**

- 9:00 **Cheatham**, Naik, Siegel & Dallos. *Modeling the cochlear microphonic in prestin knockout mice.*
- 9:30 Mistrik & **Ashmore**. *Using a large scale computational model to study the effect of longitudinal and radial electrical coupling in the cochlea.*
- 10:00 **Guinan**. *Bias-tone effects on the first-peak versus later peaks of auditory-nerve responses.*

### **Session 2: Comparative MET**

**Chairs: Köppl**

- 11:00 **Albert**, Nadrowski & Göpfert. *In vivo dissection of fly auditory mechanotransduction.*
- 11:30 **Nadrowski**, Albert & Göpfert. *Transducer-based active amplification in the hearing organ of drosophila melanogaster.*
- 12:00 **Cooper & Kemp** Announcements (poster prizes and excursion briefing)
- 12:30 Packed lunches available as you board the excursion coaches

### **Followed by half-day excursion to Delamere Forest and/or Chester : coaches depart from Medical School from 12:30.**

- 13:45 and 14:15 (optional) Go Ape and bike-hire sessions in Delamere Forest
- 14:30 (optional) 2-hour river boat cruise departs from Chester
- 17:30 Coaches depart from Chester and Delamere Forest, travelling direct to Crewe Hall
- 19:00 Drinks Reception *Crewe Hall, Table of Pillars*
- 19:30 Banquet *Crewe Hall, Long Hall*

**coaches return to Medical School from 22:00 – 22:30.**

## Wednesday, July 30

### Session 1: BM / TM properties

**Chairs:** Gummer & Fulton

- 9:00 **Newburg** & Mountain. *Mechanical response of the basilar membrane to lateral micromanipulation.*
- 9:30 **Ghaffari**, Aranyosi & Freeman. *The functional role of the mammalian tectorial membrane in cochlear mechanics.*
- 10:00 Gueta, Barlam, Shneck & **Rouso**. *The anisotropy of the tectorial membrane guides stereocilia deflection.*
- 10:30 Coffee break

### Session 2: TM / subtectorial space

**Chairs:** Russell & Fridberger

- 11:00 **Schoffelen**, Segenhout, van Dijk. *Frequency-selective response of the tectorial membrane in the frog basilar papilla.*
- 11:30 Chiaradia, Nowotny & **Gummer**. *Deflection of IHC stereocilia in response to somatic OHC electromotility.*
- 12:00 **Baumgart**, Chiaradia, Fleischer, Yarin, Grundmann & Gummer. *Fluid mechanics in the subtectorial space.*
- 12:30 Lunch *Medical School foyer & student's common room*

### Session 3: Posters (13:30-15:00)

### Session 4: Plenary – Hair bundle motility

**Chairs:** Cooper & Albert

- 15:00 **Pascal Martin**. *Unifying the various incarnations of active hair-bundle motility by the vertebrate hair cell.*
- 16:00 Tea break

### Session 5: MET and bundle motility

**Chairs:** van Dijk & Nadrowski

- 16:30 **Furness**, Mahendrasingham & Hackney. *Connections between stereociliary rootlets and lateral wall: a possible route for interactions between bundle and prestin based cochlear amplification?*
- 17:00 **Köppel**, Iwasa & Sul. *Big and powerful: a model of the contribution of bundle motility to mechanical amplification in hair cells of the bird basilar papilla.*
- 17:30 **Maoláidigh** & Jülicher. *The interplay between active hair bundle mechanics and electromotility in the cochlea.*
- 19:00 Dinner *Comus Restaurant (in the Chancellor's Building)*

## Thursday, July 31

### **Session 1: cochlear models**

**Chairs:** Elliott & Aranyosi

- 9:00 **Iwasa**, Sul, Fang & Sinha. *Cellular basis of the cochlear amplifier.*  
9:30 **Bell** & Maddess. *Tilt of the outer hair cell lattice: origin of dual tuning tips and cochlear bandwidth.*  
10:00 **Steele**, Kim & Puria. *Hook region represented in a cochlear model.*  
10:30 Coffee break

### **Session 2: cochlear models**

**Chairs:** Steele & Puria

- 11:00 Meaud & **Grosh**. *Exploring the role of hair bundle motility using a macroscopic cochlear model.*  
11:30 **Böhnke** & Scharff. *Acoustic streaming in the cochlea.*  
12:00 Lu, Mountain, **Hubbard**. *Is stereocilia velocity or displacement feedback used in the cochlear amplifier?*  
  
12:30 Lunch *Medical School foyer & student's common room*

### **Session 3: Posters (13:30-15:00)**

### **Sessions 4 & 5: (15:00-16:00 & 16:30-18:00, with tea break at 16:00)**

**(a) Business meeting and (b) open discussion**

**Chairs:** (a) Cooper & Kemp, (b) Mountain & Shera

- 19:00 Farewell Dinner & Ceilidh (featuring the Moody Food Ceili Band)  
*NB – a ceilidh is a sort of barn dance, and it's a very weird word.*  
*Comus Restaurant (in the Chancellor's Building)*

### **Poster section 1: Middle-ear mechanics**

- 1 **Cheng**, Ravicz, Hulli, Hernandez-Montes, Furlong & Rosowski. *Time average holography study of human tympanic membrane with altered middle ear ossicular chain.*
- 2 **Slama**, Ravicz, Nakajima, Dong & Rosowski. *Measurements of middle ear pressure gain and cochlear input impedance in the chinchilla.*
- 3x Dalhoff, Turcanu, **Gummer**. *A middle-ear reverse transfer function computed from vibration measurements of otoacoustic emissions on the ear drum of the guinea pig.* **ORIGINALLY SCHEDULED AS TALK #24**

### **Poster section 2: Otoacoustic emissions**

- 3 **Wittekindt**, Abel, Kössl. *Shifting the operating point of cochlear amplification? Impact of low frequency biasing and contralateral sound stimulation on DPOAEs.*
- 4 **WITHDRAWN**
- 5 **WITHDRAWN**
- 6 **Jedrzejczak**, Smurzynski, Blinowska, Kochanek & Skarzynski. *Otoacoustic emissions evoked by two-tone bursts using linear and non-linear protocol.*
- 7 **Turcanu**, Vetesnik, Dalhoff & Gummer. *Removal of the DPOAE second generation source with a pulsed paradigm method improves hearing threshold estimation in humans.*
- 8 **Meenderink** & van der Heijden. *Distortion product otoacoustic emissions evoked by tone complexes.*
- 9 **Long**, Talmadge & Prieve. *Changes in the generator and reflection components of DPOAE with development and hearing loss.*
- 10 **Bhagat** & Xu. *The influence of language experience on contralateral suppression of click-evoked otoacoustic emissions in young adults.*
- 11 **Ku**, Elliott and Lineton. *Periodicity in the spectrum of modelled spontaneous otoacoustic emissions.*
- 12 **Bergevin** & Shera. *Modeling stimulus-frequency otoacoustic emissions in the gecko.*
- 13 **Neely** & Allen. *Retrograde waves in the cochlea.*
- 14 **Cooper** & Shera. *Comparing BM vibrations & OAEs in individual ears.*

### **Poster section 3: Cochlear mechanical measurements**

- 15 **Nakajima**, Dong, Olson, Merchant, Ravicz & Rosowski. *Differential intracochlear sound pressure measurements in normal human temporal bones.*
- 16 **Olson**, de La Rochefoucauld & Dong. *Quantifying the passive substrate for active cochlear tuning.*
- 17 **Fisher**, Kowalik & Hudspeth. *Stroboscopic fluorescence imaging of electrical resonance in the chicken's basilar papilla.*
- 18 **Mellado Lagarde**, Drexler, Lukashkin, Zuo & Russell. *Novel roles for prestin in frequency tuning and neural excitation in the mouse cochlea.*
- 19 **Braun**. *Dual tuning in the mammalian cochlea: dissociation of neural and basilar membrane responses at supra-threshold sound levels – a meta-analysis.*



- 20 **Stefanovic**, Fisher & Hudspeth. *Traveling wave motion during acoustic stimulation of an in vitro cochlear preparation.*
- 21 **Gavara** & Chadwick. *Measurement of anisotropic mechanical properties of the tectorial membrane.*
- 22 **Richter**, Fishman, Rau & Fan. *Hard x-rays can be used to visualize cochlear soft tissue displacements in a closed cochlea.*

#### **Poster section 4: Cochlear mechanical models**

- 23 **Gardner-Medwin**. *Cochlear mechanics: a sideways look.*
- 24 **Aranycsi**, Ghaffari & Freeman. *Tectorial membrane waves can broaden the tips of tuning curves.*
- 25 **Fulton**. *Hensen's stripe as a topographic waveguide defines the roles of the OHC and IHC.*
- 26 **Murakami** & Unoki. *Nonlinear responses of a nonlinear cochlear model with the function of an outer hair cell model.*
- 27 **How**, Elliott & Lineton. *The influence on predicted harmonic generation of the position of the nonlinearity within micromechanical models.*
- 28 Zhang, Kim, **Lee** & Park. *Brownian energy depot model of the BM-OHC system.*
- 29 **Hubbard**. *Conjoined cochlear models: the TWAMP and the sandwich.*
- 30 **Yoon**, Kim, Puria & Steele. *Cochlear modeling using "time-averaged lagrangean" method: comparison with  $V_{bm}$ ,  $P_{st}$ , and  $Z_c$  measurements.*
- 31 **Marquardt** & Hensel. *A lumped-element model of the apical cochlea at low frequencies.*

#### **Poster section 5: Hair cells and somatic motility**

- 32 **WITHDRAWN**
- 33 **Evans** & Fettiplace. *Measurement of outer hair cell electromotility using a fast voltage clamp.*
- 34 **Iida**, Murakoshi, Kumano, Wada, Tsumoto, Ikeda, Kobayashi, & Kumagai. *Assessment of the activity of purified prestin and the effect of salicylate on prestin-chloride binding studied by isothermal titration calorimetry.*
- 35 **Kumano**, Iida, Murakoshi, Wada, Tsumoto, Ikeda, Kumagai & Kobayashi. *Increase in the activity by mutations of the motor protein prestin.*
- 36 Mahendrasingham, Furness, Fettiplace & **Hackney**. *Prestin distribution in rat outer cells: an ultrastructural study.*
- 37 **WITHDRAWN**

#### **Poster section 6: Hair bundles and transduction**

- 38 **Warren**, Lukashkin & Russell. *The dynein motor is the basis of active oscillations of mosquito antennae.*
- 39 **Dierkes**, Jülicher & Lindner. *Mechanical properties of coupled hair bundles.*
- 40 UPGRADED to a talk at the last minute – see Weds, 4:30pm
- 41 **Steyger**, Karasawa & Wang. *Trafficking of aminoglycosides into endolymph in vivo.*