The International Pupil Colloquium meeting, Special symposium on:
'Pupil Informatics: light flux sensing, non-image forming pathways, 'blindsight'
15th September 2015

UK Scientific Lead: Professor John Barbur, Centre for Applied Vision Research, School of Health Sciences, City University London.
Scientific Lead from Japan: Professor Sei-ichi Tsujimura, Faculty of Sciences and Engineering, Kagoshima University

Objective:

The symposium will advance our knowledge and understanding of pupil response mechanisms in relation to melanopsin and 'blindsight'. Equally important, the International Pupil Colloquium covers a range of topics related to vision that are of interest to Japanese scientists and are likely to lead to joint projects through international collaboration. The topics of interest include the following:

1. Role of melanopsin in the control of the pupil response
2. Novel clinical applications of Pupillometry
   Afferent, Efferent, Refractive surgery / capsulotomy
3. Pupil in Cognitive Neuroscience
4. Special Interest Symposium on Pupil Informatics - *Role of ipRGCs in the control of the pupil response, light flux sensing and blindsight* (we hope will be sponsored by JSPS)
5. New applications of stimulus-specific, cortical pupil response components
6. Pupil Responses in Non-human Species
7. Pupil pharmacology
8. Pupil in sleepiness and fatigue
9. Pupil studies in relation to disability and discomfort glare

Symposium Review:
In Greek mythology Iris was the messenger of the Gods. She was the daughter of Thaumas, the God of wonder, and Electra, a sea nymph. The union of water and wonder is of course a rainbow, reflecting the multiple colours of the human iris which form the eye's pupil. The pupil is of course also how light, the message from the Gods, enters the eye.

Given the pupil's exotic mythical past, it is disappointing that in some ways it is the body's least glamorous structure. How interesting can a hole really be?. However, without it our vision would be much worse, as it not only controls the amount of light entering the eye, it also determines the quality of the image seen. Furthermore,

monitoring its response to various stimuli is of immense clinical importance. It is after all one of the ways of determining if someone is dead! Perhaps more usefully it is also a central component of most neurological examinations and, for example, helps pinpoint the location of intra-cranial tumours and aneurysms.

Consequently, every 2 years basic scientists and clinicians from around the world with an interest in the pupil gather for the International Pupil Colloquium. Two years ago the meeting was in Alabama. This year's 31st meeting was hosted for 3 days in mid-September by Pembroke College in Oxford, birthplace of the Hobbit and Lord of the Rings.

Perhaps surprisingly, given the meeting's location, Optometry's Applied Vision Research Centre had a significant role to play. John Barbur and Hannah Gillespie-Gallery (a recent PhD graduate) were half of the organising committee. John was also a speaker at the meeting, as were Ron Douglas and Chris Tyler.

The meeting was attended by 62 delegates from 12 countries including Australia, Canada, Romania, Saudi Arabia, and the USA. The largest delegation, however, was from Japan, with 13 participants. This is in part explained by the strength of Japanese pupil research. However, the meeting was also very generously supported by the Japan Society for the Promotion of Science (JSPS). They sponsored the full costs of four scientists to attend the meeting and also contributed significantly to the running costs of the meeting. This association with the JSPS was a direct result of a JSPS sponsored visit by John Barbur to a dozen research institutions in Japan in 2014. A good example of the School of Health Sciences internationalisation activities.

A centre-piece of the meeting was the Loewenfeld lecture which honours one of the field's most eminent figures, Irene Loewenfeld's, and is given by someone who has contributed significantly to pupil research in recent years. This year it was delivered by Professor Russell Foster, FRS, CBE, head of the Nuffield Laboratory of Ophthalmology and the Sleep and Circadian Neuroscience Institute in Oxford. It highlighted the importance of a recently discovered 3rd photoreceptor type in the mammalian retina in the pupil response. These melanopsin-containing photoreceptors, which represent one of the major discoveries in the field of vision research in the last 50 years, formed a large part of the meeting and were the subject of 18 of the 50 presented papers. Optometry's Ron Douglas was in fact part of the 3 man team that first indicated a role for these photoreceptors in the pupil response in 2001.

Although the majority of the meeting revolved around the human pupil response, the meeting ended with 4 papers on the odd shaped pupils of some animals. Delegates thus learned why the cat's pupil is a vertical slit, while the pupil of sheep is elongated horizontally and the colour blind cuttlefish even has a pupil shaped like a W.

The talks were highly stimulating and although no definite answers emerged to account for the variety of optics and pupil geometries in different species, the recent progress made in understanding the function of the pupil response to light in humans and others animals and the properties of the mechanisms involved has been significant. The

delegates were assured that much remains to be done to unravel the secrets of the pupil which guarantees many more pupil symposia in years to come.

-Professor John Barbur

Symposium Participants