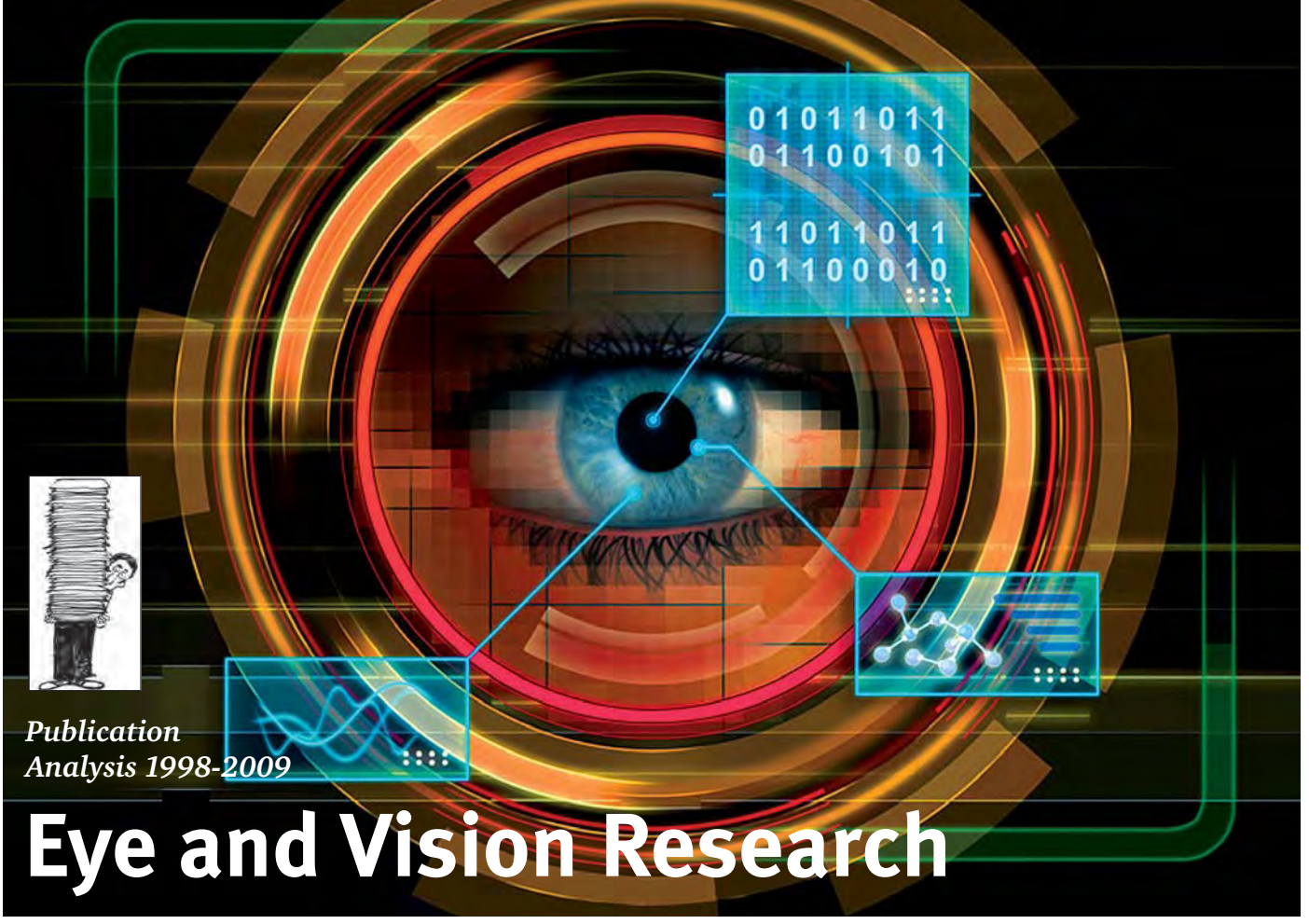

Publication Analysis 1998-2009

Eye and Vision Research

England and Germany rank far ahead the remaining European countries by total citations. Nevertheless, The Netherlands, Finland and Austria achieve the highest average citation rates in European "eye and vision research".

We see with our eyes. Really? Well, of course we don't see anything *without* eyes. For decades, however, it has definitely been no secret that the images of what we see are indeed not formed in our eyes but in the visual cortexes deep in our brains.

This fact constitutes the main problem for drawing the demarcation line between who can be included in the category "eye and vision researcher" and who would be better described as a brain scientist, studying the further processing of nerve impulses generated by light reception in the eye. This wording, however, already suggests that the demarcation line is drawn by the anatomical location of the respective research topics. To cut it short: behind the retina, where the image formed by light rays is converted into nerve impulses, you leave pure "eye and vision research" and enter "brain and vision research".

In a nutshell, this distinction only serves the purpose of avoiding the well-known "apples-and-oranges" problem and, thus, makes comparable publication analysis of "eye and vision research" as solid as possible. In clinical practise, however, the benefit of the more or less analogous separation into the fields of ophthalmology and neurology has been sharply questioned, up until today.

Closer ties between ophthalmology and neurology?

Gordon Plant, retina expert from The National Hospital for Neurology and Neurosurgery in London, for example, complains in the latest issue of *Ocular Surgery News*, "There are more ophthalmologists who are ignorant of neurology and more neurologists who are ignorant of ophthalmology than there were 20 years ago." Something that he finds particularly disturbing, given the simple fact that "when one part of the nervous system is damaged, there are degenerative processes that are transmitted to other parts". Therefore, he further asks via example, "Is glaucoma a neuro-degeneration or an optic neuropathy with secondary changes in the brain? Are the retinal changes in Alzheimer's, Parkinson's and multiple sclerosis secondary, or is the retina involved in the primary processes?"

Surely an interesting debate but let's get back to our publication analysis. In addition to defining the conceptual boundaries of the field, our comparison of publication outputs was also met by methodological constraints that are inherent to this kind of analysis. Certainly, a couple of "top papers" on "eye and vision research" from the period 1998-2009 appeared in multidisciplinary science journals like *Nature*, *Science* or *The New England Journal of Medicine*. Nevertheless, at least for the comparison of the individual countries (see tables, p. 37), we had to restrict the publication analysis to the 56 expert journals selected from the subject category "Ophthalmology" in Thomson Reuters' database *Web of Science*, which was used for this analysis. The reason is a technical one: *Web of Science* doesn't provide any sufficiently reliable tools to automatically extract relevant "eye and vision research" articles from the multidisciplinary journals. Of course, as a result, some of the most prominent papers in the field have been omitted from the "country part" of the analysis.

England and Germany far ahead

Despite this limitation, however, we believe that a survey, restricted to the specialist journals only, still provides sufficiently valid indicators for the countries' overall productivity in "eye and vision research". On the contrary, rankings of the most-cited researchers and papers (see tables, p. 38) could be analysed from publications in all journals.

Now, finally, a few words about the results. As usual, the two big European research countries – England and Germany – also dominate the 1998-2009 publication analysis "eye and vision research". In terms of both overall publication number and total ci-

tations, they came in very close together – with England ranking just slightly ahead of Germany. However, the gap between those two and France, third on the list, is considerably wider than in most of the other biomedical disciplines analysed in the earlier *Lab Times* issues. For example, the French only achieved about 30% of the total citations when compared to their English and German colleagues.

A strong publication performance was also provided by the "eye and vision researchers" based in The Netherlands. They produced "only" about 2,000 articles, which in turn have nevertheless received more than 27,000 citations to-date. This means that each 1998-2009 "eye and vision research" article from The Netherlands has been cited more than 14 times on average. This is clearly the highest citation-per-article ratio among all research nations, only Finland has halfway been able to follow at some distance (13.3). Surprisingly, Austria climbed to third place in this category – even though their average 11.4 citations per article already meant a considerably large span to the top.

Taken together, Europe's "eye and vision researchers" didn't quite come up to the publication performance of their US colleagues. The latter produced about 13% more articles in the expert journals, which in turn have attracted almost 35% more citations in total, to-date. Furthermore, Japan, Australia and Canada all ranked clearly ahead of France, the European third, when it comes to total citations.

The European countries result is nicely reflected by the list of the 30 most-cited "eye and vision researchers" (see table, p. 38): Three researchers from Vienna, led by Wolfgang Drexler in third position, made Austria the third most represented country in the list. England and Germany, on the other hand, both placed ten heads respectively among the top 30. Seven of the English colleagues were based in London, including Alan Bird, whose 1998-2009 publications collected by far the most total citations of all European "eye and vision researchers".

Eye diseases, the rest and one "exotic" player

As could be expected, the majority of the 30 most-cited heads are based in eye hospitals or ophthalmology institutes and, therefore, study eye diseases and their therapies. Alan Bird, the most-cited, for example, is an expert for retinal diseases such as retinal dystrophies and age-related macular disease. Further topics, which are predominantly represented by the clinical eye researchers in the list are glaucoma, retinitis pigmentosa, diabetic eye diseases, cataract surgery and corneal transplantation.

The 11 non-clinical eye researchers on the list are distributed as follows: three human geneticists, as represented by Frans Cremers (13th); three researchers from Medical Physics or Biophysics, including Wolfgang Drexler (3rd) and Pablo Artal (24th); two basic brain researchers whose focus is on the neurobiology of the retina, Andreas Reichenbach (10th) and Heinz Wässle (17th); and two researchers who study retina development and differentiation, William A. Harris (18th) and Jochen Wittbrodt (20th).

There remains "number 30", Innes Cuthill, who rather constitutes a real "exotic" in the list. His topic is the ecology of vision including, for example, the interaction between ecological challenges and the acquirement of certain features and capabilities of animals', mostly birds', eyes. Thus, Cuthill very much seems like an "apple" among all the "oranges" of human eye (disease) researchers but, nevertheless, he can undoubtedly be regarded a true "eye and vision researcher".

Ralf Neumann

Europe...

Country	Citations	Articles	Cit./Art.
1. England	100,277	10,521	9.5
2. Germany	97,253	10,337	9.4
3. France	29,024	3,959	7.3
4. Netherlands	27,148	1,929	14.1
5. Italy	25,926	2,960	8.8
6. Switzerland	23,897	2,340	10.2
7. Spain	22,620	2,119	10.7
8. Scotland	14,817	1,390	10.7
9. Austria	14,638	1,281	11.4
10. Sweden	13,272	1,213	10.9
11. Israel	12,792	1,587	8.1
12. Turkey	12,373	2,207	5.6
13. Ireland	7,395	822	9.0
14. Finland	7,145	538	13.3
15. Wales	6,760	657	10.3
16. Greece	6,606	771	8.6
17. Belgium	5,397	630	8.6
18. Denmark	4,966	484	10.3
19. Hungary	2,762	335	8.2
20. Portugal	2,709	267	10.2

Articles appearing between 1998 and 2009 in 'eye and vision journals' as listed by Thomson Reuters' *Web of Science* under 'Ophthalmology'. The citation numbers are accurate as of October 2011. A country's figures are derived from articles, where at least one author working in the respective European nation is included in the authors' list. Israel is included because it is a member of many European research organisations and programmes (EMBO, FP7 of the EU...).

... and the World

	Citations	Articles	Cit./Art.
Europe	378,672	42,946	8.8
USA	509,036	48,591	10.5
Japan	77,896	9,376	8.3
Australia	52,122	4,521	11.5
Canada	39,302	4,430	8.9
China	21,182	2,587	8.2
India	17,569	2,491	7.1

Publication Analysis 1998-2009 – **Eye and Vision Research**

Most Cited Authors...

		Citations	Articles
1.	**Alan C. Bird**, Moorfields Eye Hosp. Univ. Coll. London	14,580	399
2.	**John V. Forrester**, Ophthalmol. Univ. Aberdeen	10,544	149
3.	**Wolfgang Drexler**, Med. Phys. Med. Univ. Vienna	6,660	148
4.	**Jost B. Jonas**, Ophthalmol. Med. Fac. Mannheim Univ. Heidelberg	6,232	320
5.	**Paulus T.V.M. De Jong**, Ophthalmol. Acad. Med. Ctr. Amsterdam	5,347	106
6.	**Shomi S. Bhattacharya**, Inst. Ophthalmol. Univ. Coll. London	5,314	146
7.	**Jorge L. Alio**, Vissum Inst. Ophtalmol. Alicante	4,981	303
8.	**Ursula Schmidt-Erfurth**, Ophthalmol. Med. Univ. Vienna	4,773	123
9.	**Anthony T. Moore**, Moorfields Eye Hosp. Univ. Coll. London	4,307	130
10.	**Andreas Reichenbach**, Paul Flechsig Inst. Brain Res. Univ. Leipzig	4,154	182
11.	**Anselm Kampik**, Ophthalmol. Univ. Hosp. Munich	4,019	234
12.	**Eberhart Zrenner**, Eye Hosp. & Ophtalmic Res. Univ. Tübingen	3,809	183
13.	**Frans P.M. Cremers**, Human Genet. Radboud Univ. Nijmegen Med. Ctr.	3,756	104
14.	**Peng Tee Khaw**, Moorfields Eye Hosp. Univ. Coll. London	3,725	130
15.	**Bernhard H.F. Weber**, Human Genet. Univ. Regensburg	3,689	140
16.	**Robin R. Ali**, Inst. Ophthalmol. Univ. Coll. London	3,598	82
17.	**Heinz Wässle**, Max Planck-Inst. Brain Res. Frankfurt	3,558	59
18.	**William A. Harris**, Physiol. Dev. & Neurosci. Univ. Cambridge	3,472	57
19.	**Oliver Findl**, Ophthalmol. Hanusch Hosp. Vienna	3,393	152
20.	**Jochen Wittbrodt**, Ctr. Organismal Studies Univ. Heidelberg	3,379	80
21.	**Russell G. Foster**, Nuffield Lab. Ophthal. J. Radcliffe Hosp. Univ. Oxford	3,321	77
22.	**Gisèle Soubrane**, Ophthalmol. Ctr. Hosp. Intercom. Créteil Univ. Paris	3,307	141
23.	**Andreas Gal**, Human Genet. Univ. Med. Ctr. Hamburg-Eppendorf	3,269	104
24.	**Pablo Artal**, Lab. Opt. Univ. Murcia	3,255	90
25.	**Paul J. Foster**, Moorfields Eye Hosp. Univ. Coll. London	3,179	114
26.	**Frank G. Holz**, Ophthalmol. Univ. Bonn	3,174	171
27.	**Klaus P. Hofmann**, Med. Phys. & Biophys. Charité Univ. Med. Berlin	3,109	68
28.	**Josef Flammer**, Ophthalmol. & Eye Hosp. Univ. Basel	3,056	192
29.	**Fred W. Fitzke**, Inst. Ophthalmol. Univ. Coll. London	3,019	116
30.	**Innes C. Cuthill**, Ecol. of Vision Grp. Sch. Biol. Sci. Univ. Bristol	3,000	80

Citations of articles published between 1998 and 2009 were recorded up until October 2011 using the *Web of Science* database from Thomson Reuters. The "most-cited papers" had correspondence addresses in Europe or Israel.

... and Papers

	Citations
1. Harris, CM ; Wolpert, DM Signal-dependent noise determines motor planning. *NATURE 394 (6695): 780-84 AUG 20 1998*	664
2. Heijl, A; Leske, MC; Bengtsson, B; Hyman, L; Bengtsson, B; Hussein, M Reduction of intraocular pressure and glaucoma progression – Results from the early manifest glaucoma trial. *ARCHIVES OF OPHTHALMOLOGY 120 (10): 1268-79 OCT 2002*	601
3. Delettre, C; Lenaers, G; Griffoin, JM; [...]; Ducommun, B; Kaplan, J; Hamel, CP Nuclear gene OPA1, encoding a mitochondrial dynamin-related protein, is mutated in dominant optic atrophy. *NATURE GENETICS 26 (2): 207-10 OCT 2000*	473
4. Alexander, C; Votruba, M; Pesch, UEA; [...]; Auburger, G; Bhattacharya, SS; Wissinger, B OPA1, encoding a dynamin-related GTPase, is mutated in autosomal dominant optic atrophy linked to chromosome 3q28. *NATURE GENETICS 26 (2): 211-15 OCT 2000*	436
5. Bainbridge, JWB; Smith, AJ; Barker, SS; [...]; Rubin, GS; Moore, AT; Ali, RR Effect of gene therapy on visual function in Leber's congenital amaurosis. *NEW ENGLAND JOURNAL OF MEDICINE 358 (21): 2231-39 MAY 22 2008*	376