



A schematic representation of the human retina showing photoreceptors (PRs), other retinal neurons, Müller glia, microglia, astrocytes and vessels. The outer nuclear layer (ONL) is composed of the cell bodies of rod and cone PRs; the inner nuclear layer (INL) contains the cell bodies of several types of neurons (horizontal cells, bipolar cells and amacrine cells) as well as the bodies of Müller glia. The ganglion cell layer (GCL) contains ganglion cells.

result in upregulation of voltage-gated Na channels in the pain signalling pathways, and a Na channel subtype has been associated with inherited human pain disorders. Dib-Hajj *et al.* review the current state of knowledge on the role of Na channels in normal and pathological pain.

Axons are long tubular extensions of the neuron. Wallerian degeneration refers to the degeneration in the distal end of the axon from the site of cut. The review by Coleman and Freeman describes the molecular and cell biology associated with Wallerian degeneration, in particular the role of a single protein *Wld^S* that delays Wallerian degeneration and has relevance in understanding axonal injuries.

The motor neurons in the spinal cord are highly diverse in morphology and function, and the muscle fibres that they connect to. In neurodegenerative diseases like amyotrophic lateral sclerosis (ALS) and spinal muscular atrophy (SMA), fast fatigable motor units degenerate first, while motor units serving slow muscles, like those involved in eye movement, degenerate last. The developmental regulation of growth and survival of motor neuron subsets and the role of GNF (glia derived neurotrophic factor) and Cu-Zn superoxide dismutase (SOD2) in motor neuron diseases is reviewed by Kanning, Kaplan and Henderson.

Lin and Koleske highlight the different molecular and cellular mechanisms related to actin cytoskeleton and scaffolding proteins in the stability and maintenance of dendrites, and how destabilization of dendrites results in neuropsychiatric disorders like depression and schizophrenia, and neurodegenerative disorders like Alzheimer's disease.

The photoreceptor in the retina is one of the most genetically vulnerable cells in mammals, with more than 140 genes associated with death of the photoreceptor. The article by Bramall *et al.* reviews the genomic, biochemical and cellular responses of the retina in inherited photoreceptor degenerations and the prospects of treating these disorders using gene therapy.

The neurocutaneous disorder, neurofibromatosis type I, is a genetic disorder associated with loss of cognitive function, problems with motor control and learning disabilities. The review by Shilyanski, Lee and Silva examines the role of the *NF1* gene that encodes neurofibrin with efficient Ras-GAP activity, and its cellular importance in regulating the balanced release of the inhibitory transmitter, GABA, whose disturbance lowers the inhibitory network activity which in turn results in cognitive deficits.

Most recent developments in the molecular pathways involving progranulin

and the 43 kDa transactivating responsive sequence DNA-binding protein (TDP-43) affecting neuronal viability in frontotemporal lobar degeneration are reviewed by Slegers, Cruts and Broeckhoven.

What I have done above is to categorize the information content in the articles broadly which might help the readers to make reading choices that are sometimes useful in the age of information overload. The *Annual Reviews* are always useful in one's research and teaching, since the advanced developments in the field are put together concisely and this volume is no exception. Neuroscientists, neurologists and psychiatrists will find it useful.

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Eyes on the Sky – The Story of Telescopes, Biman Nath. Vigyan Prasar, Department of Science and Technology, A-50, Institutional Area, Sector 62, Noida 201 307. 2009. vii + 159 pp. Price: Rs 140.

Telescopes were known as 'spy glasses' until Ioannes Dimisiani, a Greek mathematician used the word 'telescope' (meaning far-seeing) for the first time in 1612.

The book under review is a meticulous weave of historical threads into a comprehensible narrative account on telescopes. *Eyes on the Sky*, a part of the Vigyan Prasar publication series, was brought out to mark the International Year of Astronomy in 2009, and also to commemorate the 400th anniversary of the first astronomical observations with a telescope by Galileo Galilei and the publications of Johannes Kepler's *Astronomia nova* (new astronomy). Vinay B. Kamble, Director, Vigyan Prasar, reiterates the theme in his Foreword.

Within its 159 pages, Biman Nath has been able to produce an easy-to-understand narrative. The book is basically written for pupils from schools and colleges or early buds in this field.

Interesting facts on the history of telescope, its making, coining of the term and developments in India, Europe, Greece and Arabic countries have been

BOOK REVIEWS

vividly talked about in the first two chapters of the book.

History explains how a spurt in experimentation with lenses led to devising new telescopic designs and laid the foundation for further research. Chapter 3 is an insight into the telescopes of the 17th century. Advances and challenges faced during the development of different types of telescopes by Huygens, Newton, Gregory and others add to the content of the chapter. Growth of reflecting telescopes in the 18th century is extensively dealt with in chapter 4. It also highlights the problems that Newton and others faced while trying to enhance the accuracy of the mirror used in a reflecting telescope. Thereafter, the telescopes found a commercial market; not only for wealthy dabblers in science, but also for professional astronomers.

Further reading reveals the startling discoveries witnessed in the 18th and 19th centuries, while working on telescopes. And the birth of a new field of study, astrophysics – the study of the physics and chemistry of materials that celestial objects were made of. Chapter 5 briefly summarizes advancements in astrophysics in its naïve stage. While the chapter deals with history, it also mentions about what goes in making a discovery – the pursuit of a scientist. For example, how Jesse Ramsden's (an instrument manufacturer) continuous devotion for 15 years helped him design a machine which could make a screw thread (for accurate measurements) whose helix was accurate to within 10 μm .

This well-structured narrative further discusses how: (a) the entry of amateurs



Proposed design for the Giant Magellan Telescope.

Box 1. Historical facts on telescopes and astronomy.

1. In 1609, Galileo Galilei used for the first time an instrument to look at the stars (p. 1).
2. Ioannes Dimisiani used the word telescope for the first time in 1612 (footnote: p. 16).
3. Christian Huygens invented the pendulum clock, which together with the telescope became the essential tools of astronomers to keep track of the position of stars as the earth moved (p. 22).
4. Isaac Newton showed his first reflecting telescopes in 1672, which was just about 30 cm long with a magnification power of 40 (p. 23).
5. Jean Baptiste Morin of France was the first to put the Vernier scale on a telescope (p. 26).
6. In 1781, William Herschel discovered the planet Uranus using his 40 ft telescope and the sixth and seventh satellites of Saturn. He also discovered 'infrared' light, a harbinger in modern astrophysics in 1800 (pp. 40, 42, 43).
7. In 1801, Giuseppe Piazzi discovered Ceres (now called a dwarf planet, in the same category as Pluto; p. 47).
8. Neptune was discovered on 23 September 1846 by John Adams and Urbain Le Verrier (p. 54).

helped in building reflectors and improving telescopes, using which major discoveries were etched in the history; (b) the art of photographing the observations for records underwent a transition during the 19th century; (c) the role of observational astronomy, and (d) the development of spectroscopes revolutionized the science of astrophysics.

Chapter 6 describes telescopes at the end of the 19th century, which focused on measurement of the positions of the stars and their brightness using a photometer. Further in the chapter, factors affecting scientific activity or the making of telescopes, like lifting of glass tax by the Government of England and the American Civil War find place in the narrative.

Switching from history to modern astronomy, Nath highlights the big telescopes – their development, discoveries made using them and their shortcomings in chapter 7, with a brief account of modern or future telescopes in chapter 8. He also narrates how the use of photomultipliers (a new type of detector) helped astronomers test the predictions of theories of stellar evolution.

At that time capturing images was a problem. The chapter summarizes the developmental journey of recording observations with the help of a photographic plate to 'vidicon' – digitized image capture using a television camera. It talks about the change in recording observations as a leapfrog from early photographic techniques. Also, application

of modern technology, like charge-couple devices in designing new telescopes has been included. The chapter ends up with the proposed future plans.

Radio telescopes have been dealt with two chapters, one narrating its use in the detection of radio waves and the other about the discoveries made using them, for example quasars. Similarly, an explicit account of space-borne telescopes and modern astronomy brings Nath's narrative to an optimistic end.

Overall Nath has been able to make telescopic history an interesting read in a story-telling format, avoiding technical jargon. Also insertion of a number of colourful figures and illustrations makes it interesting for a general reader. Footnotes supplemented throughout the book are helpful to dig more into the history, revealing much information which only experts in the field would have known (Box 1). However, reference for additional reading is missing.

The text deserves careful proof-reading to check for spelling mistakes. For example, on p. 47, the 'Guiseppe' has been misspelt as 'Giuseppi'.

In short, this book is apt for a reader who wants to get acquainted with telescopes and the world of astronomy. A chapter on telescopes in India, highlighting major discoveries made using them would be a useful addition.

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