Shaw Prize 2016

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The Shaw Prize in Mathematical Sciences for 2016 was awarded to Nigel James Hitchin of Oxford University "for far-reaching contributions to geometry, representation theory and theoretical physics. The fundamental and elegant concepts and techniques that he has introduced have had wide impact and are of lasting importance." Hitchin recently retired as Savilian Professor of Geometry and is now emeritus professor at Oxford University.

Now in its 13th year of presentation, the Shaw Prize is widely regarded as the "Nobel of the East" and is awarded annually for significant contributions to astronomy, life science and medicine, and mathematical sciences. From this year onwards, the monetary reward for each award is increased from US$1 million to US$1.2 million. This year's prize in the mathematical sciences is awarded to a geometer who has made fundamental contributions not only to differential and algebraic geometry but also to mathematical physics.

It is interesting to know that Hitchin's later interest in mathematical physics was influenced by, if not the direct result of a serendipitous turn of event early on in his graduate research career. As an undergraduate in Oxford University he was more interested in pure mathematics. His DPhil thesis (1972) was, in fact, in differential geometry and his original supervisor was the topologist Brian Steer. It happened that Steer was away on sabbatical leave for a year and Michael Atiyah (Fields Medal 1966), who was visiting Oxford University, became his alternate supervisor. This proved to be crucial to Hitchin in widening his research interests and horizons to problems in algebraic geometry, topology and differential geometry.

Atiyah's influence must have been strong enough to make him take up a position as Atiyah's research assistant at the Institute for Advanced Study, Princeton where Atiyah had become a permanent member. This was followed by a short stint as Courant Institute Instructor at New York University. This short but formative period (1971–1974) of about 3 years in the US set the direction for his future ground-breaking work in mathematical physics. In 1974 Hitchin returned to Oxford University as an SRC research assistant and subsequently as Junior Research Fellow in his alma mater (Wolfson College). Except for a period from 1990–1997 when he was professor of mathematics at University of Warwick and Cambridge University variously, it was at Oxford that his earlier interest in the twistor theory of Roger Penrose bore fruit and provided a bridge between mathematics and physics. Penrose had recently been appointed to a Chair at Oxford when Hitchin returned from the US. This was a period of flowering of ideas with a spate of discoveries about instantons, to which the Oxford school of mathematics (Penrose, Richard Ward, Atiyah and Hitchin) contributed.

Hitchin's success with instantons was followed, hot on the heels, by his work on magnetic monopoles. It was during a sabbatical at Stony Brook in 1983–1984 that his discussion with the theoretical physics group led to his discovery of a framework in hyperkähler geometry which could be used to resolve many issues in theoretical physics. It was subsequently found that this work led to numerous ramifications for algebraic

geometry and the representation theory of surface groups, generalisations of integrable systems, and the geometric Langlands programme. So impressed was C N Yang that he appealed to Hitchin to stay on at Stony Brook, but, of course, Hitchin was totally dedicated to England.

Hitchin has supervised at least 36 doctoral students including one Fields Medallist (Simon Donaldson in 1986) who was also a recipient of the Shaw Prize 7 years earlier, in 2009. The depth and extent of his influence on mathematics and the mathematical community is clearly reflected by a long programme of celebration of his 70th birthday from 5–16 September 2016 held in 3 countries. It was organised by his colleague Frances Kirwan and a group of his former students, in partnership with the Clay Mathematics Institute. It began with a workshop (5–8 September 2016) in Aarhus, Denmark on differential geometry and quantisation and ended with a second workshop (12–16 September 2016) in Madrid, Spain on Higgs bundles and generalised geometry. In between (9–11 September 2016), a general conference on geometry was held at the Mathematical Institute, Oxford. Some of the fields influenced and areas created by Hitchin's work are spin geometry, instanton and monopole equations, twistor theory, symplectic geometry of moduli spaces, integrables systems, Higgs bundles, Einstein metrics, hyperkähler geometry, Frobenius manifolds, Painlevé equations, generalised geometry, special Lagrangian geometry and mirror symmetry.

In an interview with Martin Bridson before his official retirement from Oxford University where he has been Savilian Professor since 1997, Hitchin reflected on a life so charmed right from the serendipitous beginning of his research career, following the footsteps of a master and returning to his roots in a quiet English academic environment which suited him socially and academically. It is a story of inspiration to beginning researchers searching for a niche as well as to older researchers trying to keep up with the current pace of development.

Sources:

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