THE UK NOVA/SUPERNOVA PATROL—THE FIRST 25 YEARS

Guy M. Hurst
Co-ordinator, UK Nova/Supernova Patrol
16 Westminster Close
Basingstoke
Hants, RG22 4PP
England

Presented at the 89th Spring Meeting of the AAVSO, April 15, 2000

Abstract

The history, accomplishments, and activities of the UK Nova/Supernova Patrol are described.

1. The early nova patrol

The main aim of The Photographic Sky Patrol, formed in 1974 by *The Astronomer* magazine, was to record the sky using standard 50mm lenses to provide a regular and extensive coverage of the night sky. Exposures of around 30 seconds, undriven, avoided significant trailing. The limiting magnitude was typically 9–10.

These negatives were filed for later reference in case a discovery claim was lodged or an unusual sighting needed investigation. No systematic check was made of these films unless an alert was received.

However in 1974, a nova was found in Perseus by N. Sanduleak and announced on *IAU Circular* No. 2716, and later designated V400 Persei. Although the nova had already faded to magnitude 11 by the time it was found on an objective prism plate of November 9, 1974, there was a possibility that it had been brighter at an earlier date and been missed.

Discussion on this topic took place at a committee meeting of *The Astronomer* in early 1975 which, although held to debate administrative matters relating to the magazine, strayed into the exciting possibility that the Sky Patrol might have negatives showing V400 Persei pre-discovery. A simple wooden "light box" was set up with twin light bulbs and appropriate glass on which negatives could be placed.

Amidst great excitement of committee members, the author found pre-discovery images of V400 Per on several exposures by D. Jones taken several months earlier and these indicated the maximum brightness was around magnitude 8. This single event convinced everyone present that the patrol methods should be changed so that in future photographs should be checked for novae. Later, visual searches were also added and, subsequently, also the hunt for supernovae in external galaxies.

The end result was that the search was re-named the "UK Nova/Supernova Patrol" and it was re-launched in June 1976.

For the nova search, 121 areas approximately ten degrees square were selected along the Milky Way and stretching as far south as declination -30°. Typically, four areas, two in the winter sky and two in the summer, were initially allocated to visual observers who set out to check these using binoculars. The photographers provided master prints for comparison as it was established early in the project that all atlases suffered from star omissions, which could lead to numerous false alarms.

Photographers changed from the early 50mm lenses to the 135mm telephoto lens, which ideally covered the 10-degree fields. Experiments showed that an exposure of one minute driven would enable limiting magnitudes of 11 to be reached despite the extensive light pollution suffered by many members. It was also considered vital that for each area a second frame always be obtained so that spurious images could easily be eliminated. A master library of photographs was quickly compiled of all 121 areas from which prints could be provided to any patroller starting out. Other patrollers constructed various forms of blink comparators, including twin slide projectors with a rotating wheel allowing alternating beams to be "blinked" on a screen and intruders spotted as flashing objects.

It was obvious that what the patrol needed was an early success to encourage others to join the cause. On 1977 January 7, John Hosty of Huddersfield, England, provided just the tonic needed when he found a nova in Sagitta during visual sweeps with binoculars. However the discovery was quite remarkable since the field was only about 10 degrees high and almost lost in the light polluted skies of Huddersfield. The author, some years later, stood on the spot where John was observing at the time of discovery and with all the roof tops and chimney obstructions it almost defied belief that anyone could spot even a magnitude 7 nova in such circumstances.

Confirmation proved extremely difficult, but a few days later sightings by George Alcock, himself an avid nova hunter, and the author provided confirmation and the object was announced on *IAU Circular* No. 3025 and was later designated as HS Sagittae.

Another patrol member, Robert McNaught, having moved to Australia, provided two further successes using photography, with V842 Cen (Nova 1986) and V4135 Sgr (Nova 1987). In 1988 Dave McAdam discovered a nova in Andromeda which was later designated PQ Andromedae and is believed to be a rare WZ-Sagittae type variable.

At this stage John Hosty's success remains the only nova to be found visually by patrol members.

2. Supernova hunting

It was decided to add supernova hunting to the patrol and members Mirko Villi and Giancarlo Cortini in Italy achieved success with the discovery of Supernova 1991T in NGC 4527 and Supernova 1994W in NGC 4041. The successes in Italy continued with two more supernovae found by Stefano Pesci and Piero Mazza. However, it was not until October 12, 1996, that the first supernova was discovered from England by Mark Armstrong. Incredibly, there had never been a recorded "English" supernova discovery in an external galaxy until that day!

Mark's discovery involved the use of a CCD and, as so often happens when such a record is broken, more English discoveries followed, but no one expected the "avalanche" which was to follow. The power of CCDs to record really faint objects, some down to magnitude 19, proved decisive.

Table 1 provides details of all supernovae found by patrol members up until the end of March 2000.

Whilst Mark Armstrong led the way, Tom Boles, also using a CCD, started to clock up supernova discoveries. Table 2 shows the breakdown by observer of the 24 discoveries made up to the end of March 2000.

In addition, Ron Arbour, although not a patrol member, has contributed several discoveries over the same period and has provided vital assistance in obtaining confirmation of those found by others.

3. Nova patrol with CCDs

Recently the author has experimented with the use of a CCD (Starlight Xpress MX516) in conjunction with a 50mm lens. The reason for this possible new avenue for patrol members is the disadvantage experienced by photographers who cannot check films until time has been found to develop them. Many of our patrollers face

Table 1. Patrol supernova discoveries to 2000 March 31.

No	Year	Date	Supernova	Galaxy	Discoverer(s)
1	1991	Apr 15	1991T	NGC 4527	Mirko Villi and Giancarlo Cortini (Italy)
2	1994	July 29	1994W	NGC 4041	Giancarlo Cortini and Mirko Villi
3	1995	Nov 1	1995 al	NGC 3021	Stefano Pesci and Piero Mazza (Italy)
4	1996	Oct 12	1996 bk	NGC 5308	Stefano Pesci and Piero Mazza
5	1996	Oct 23	1996 bo	NGC 673	Mark Armstrong (First UK!)
6	1997	Apr 7	1997 bq	NGC 3147	Stephen Laurie (UK)
7	1997	Oct 29	1997 dn	NGC 3451	Tom Boles (UK)
8	1998	Mar 10	1998 V	NGC 6627	Mark Armstrong
9	1998	Apr 13	1998 aq	NGC 3982	Mark Armstrong
10	1998	Apr 29	1998 bp	NGC 6495	Mark Armstrong
11	1998	May 9	1998 bu	NGC 3368	Mirko Villi
12	1998	Oct 19	1998 eq	UGC 12133	Tom Boles
13	1999	Apr 9	1999 bt	Anon	Tom Boles
14	1999	Oct 4	1999 eg	IC 1861	Mark Armstrong
15	1999	Oct 12	1999 eh	NGC 2770	Mark Armstrong
16	1999	Nov 7	1999 ev	NGC 4274	Tom Boles
17	1999	Nov 6	1999 gg	MCG +7-8-11	Tom Boles
18	1999	Nov 17	1999 gj	NGC 3251	Mark Armstrong
19	1999	Dec 14	1999 gl	NGC 317B	Tom Boles
20	1999	Dec 23	1999 gq	NGC 4523	Mark Armstrong
21	1999	Dec 13	1999 gr	MCG+5-29-24	Mark Armstrong
22	2000	Jan 8	2000 C	NGC 2415	Steve Foulkes
23	2000	Jan 22	2000 D	UGC 1767	Tom Boles
24	2000	Feb 7	2000 H	IC 454	Mark Armstrong

Table 2. Supernova Tally by Patrol Members as of 2000 March 30.

Observer	Number of discoveries
Mark Armstrong	10
Tom Boles	7
Mirko Villi	3
Stefano Pesci	2
Steven Foulkes	1
Stephen Laurie	1

demanding daytime jobs, which involve long hours, and it is common to find yourself with exposures in the camera, which might not be taken to the darkroom for several days. The inevitable result is that someone else finds the nova and the feeling you also have an image, undeveloped in your camera, is hardly a morale-booster!

The extraordinary sensitivity of these CCD systems was demonstrated by the recording of stars as faint as magnitude 12 in 3–4 seconds using an undriven 50mm lens at f/1.8. In fact, for nova hunting in the Milky Way, it is wise to avoid going too faint due to the crowded star fields which need checking. As with photography, spurious images do appear and therefore CCD patrol members always obtain two consecutive images to help eliminate these.

A disadvantage, compared with the photographic patrol with the 135mm telephoto lens, is that the CCD field is only about five degrees, so four times as many different exposures are needed (plus ‘twin shots’) as photographs.

4. Future of the patrol

We are keen to foster links with observers throughout the world who are interested in looking for novae and supernovae. Despite the large volume of discoveries of supernovae which now take place each year, there is still much to be learnt about these objects.

The search for novae, if anything, is rather neglected but offers an attractive project for all observers especially as very basic equipment, such a pair of 10x50 binoculars, is sufficient to get started.

The patrol also recognises there is scope to track the decline of these objects for longer periods to look for unusual activity in their light curves. Many observers follow both novae and supernovae near maximum but after the initial excitement dies down, they tend to be neglected by all but the dedicated few.

Some members are exploring equipment and techniques to obtain spectra of objects discovered. With the brighter novae this presents little difficulty and some success with supernovae as faint as magnitude 14 has been achieved by Maurice Gavin. However, the really faint supernovae still represent an extremely difficult challenge.

Finally, confirmation is vital before passing details to the Central Bureau for Astronomical Telegrams where Dr. Brian Marsden and his team deal with discovery announcements. We operate a very small team of observers around the world who will check discovery claims by others so we can be absolutely sure they are genuine before passing them to the professionals and circulating news on the Internet.

We welcome contact from any individual or group around the world with similar interests to our own (http://www.demon.co.uk/astronomer).