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ON THE NATURE OF THE SUSPECTED DWARF NOVA, HP ANDROMEDAE†

NOGAMI, D.[1]; ISHIOKA, R.[2]; MAKITA, M.[2]; KATO, T.[2]; YAMAOKA, H.[3]; UEMURA, M.[2]; MINESHIGE, S.[4]

[1] Hida Observatory, Kyoto University, Kamitakara, Gifu, 506-1314, Japan;
e-mail: nogami@kwasan.kyoto-u.ac.jp

[2] Dept. of Astronomy, Kyoto University, Kyoto 606-8502, Japan;
e-mail: (ishioka, uemura, tkato, makoto)@kusastro.kyoto-u.ac.jp

[3] Faculty of Science, Kyushu University, Fukuoka 810-8560, Japan; e-mail: yamaoka@rc.kyushu-u.ac.jp

[4] Yukawa Institute for Theoretical Physics, Kyoto University, Kyoto 606-8502, Japan;
e-mail: minesige@yukawa.kyoto-u.ac.jp

Seliwanow (1926) reported on a discovery of a variable star designated as 126.1925 at a photographic magnitude of 10.5 in one plate among four searched, and showed a hand-drawn chart. Brun and Petit (1957) listed this object as a suspected dwarf nova. The formal variable star name HP And was given in the 62nd Name List (Kukarkin et al., 1976). The object has been systematically monitored by a number of amateur astronomers (e.g. VSOLJ, VSNET members) since the publication on this object in the General Catalogue of Variable Stars fourth edition (Kholopov et al., 1985), but no secure outburst has been recorded.

The quiescent identification was done by Kato (1990, unpublished) by comparison with the POSS prints. A quiescent counterpart, selected by its relatively bright appearance on POSS O plate, has been suggested, and a CCD V-band chart marking on this object was distributed among world-wide observers. An attempt of spectroscopic confirmation of the dwarf nova nature by Zwitter, Munari (1994) failed due to its faintness ($V > 17.0$) at their observation. Misselt (1996) and Skiff (1998) gave secondary photometric standard stars around HP And. Downes et al. (2001) identified an object on a Digitized Sky Survey plate with HP And (`http://icarus.stsci.edu/~downes/cvcat/`). This variable star was not found in the 2MASS Second Incremental Data Release (Hoard et al., 2002).

The object has recently received special attention because the suggested outburst amplitude may be comparable to those of WZ Sge stars (e.g. Kato et al., 2001), if the object is indeed a dwarf nova.

To reveal the nature of this suspected dwarf nova HP And, we made an observation at the 8.2m optical-infrared Subaru telescope on Mauna Kea, Hawaii during spare time assigned to the proposal ID o02115. A non-filtered image was obtained with an exposure time of 30 sec at 2002 October 10.495(UT) by the Faint Object Camera and Spectrograph (FOCAS, see Kashikawa et al., 2002). The limiting magnitude of the image is estimated to be 25.0, or larger.

†Based on data collected at Subaru Telescope, which is operated by the National Astronomical Observatory of Japan.

Fig. 1 shows a chart around HP And extracted from the de-biased Subaru/FOCAS image. The suspected object is definitely a late-type galaxy with a relatively strong bulge condensation. The object certainly looks non-stellar on a DSS II image (Fig. 2), although it was not clear on POSS I plates. For comparison, we put the scanned chart in Seliwanow (1926) in Fig. 3. This galaxy is listed in the USNO-B1.0 catalog as ID 1314-0006148 with $B1 = 19.56, B2 = 18.78, R1 = 17.69, R2 = 16.99$, and is identified in the APM-North Catalogue (McMahon et al. 2000) with EO1243-0297148 which has a major axis diameter of 8.7 arcsec in R band and a ellipticity of 0.18.

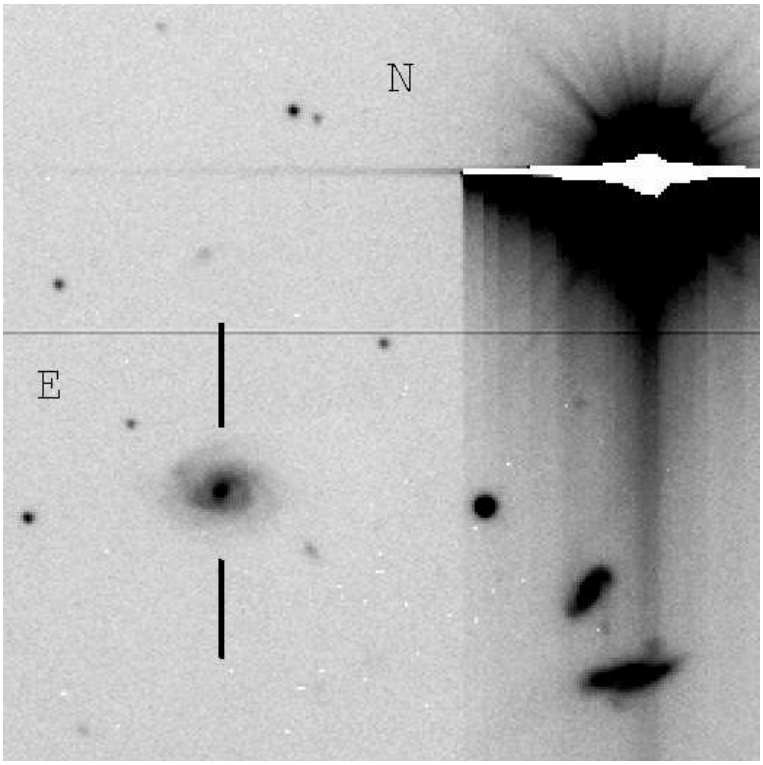

Figure 1. A Subaru/FOCAS image of HP And. The field of view (FOV) is about $1' \times 1'$. North is up, and East is left. The seeing is $0\farcs33$. The limiting magnitude is estimated to be 25.0 or larger. The object having been identified with HP And clearly has spiral arms, and thus is a galaxy.

If HP And is a variable star in our Galaxy, superposed on the anonymous galaxy, the amplitude must exceed 10 mag and be a nova, or a dwarf nova with a quite large amplitude. Since the galactic latitude is high ($-21°$), this should be one of the rare cataclysmic variable stars in the halo. If HP And is a transient object in the anonymous galaxy, a possibility of a supernova is not likely because the variable star at the maximum was too luminous compared to the host galaxy. A GRB afterglow similar to the nearby GRB 030329 might be caught by chance. The other possibilities are spurious detection, such as a ghost of a bright star, a plate defect, inaccuracy of the hand-drawn chart, and so on. Close examination of the original plate and the astrometry will yield a fruitful result.

We deeply thank Y. Ohyama and the support staffs for their help during the observation at Subaru telescope. This research has made use of an image of the Digitized

Figure 2. A chart taken from the Digitized Sky Survey 2nd in I band (Plate ID: A25N). The suspected object at the center looks non-stellar. The FOV is $5' \times 5'$.

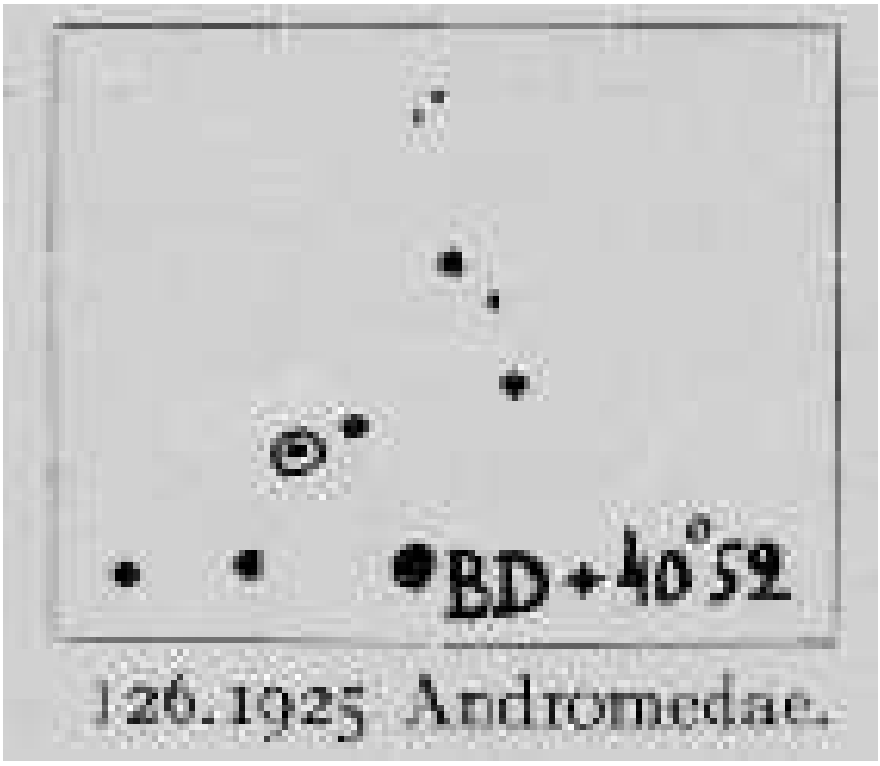

Figure 3. The scanned chart in Seliwanow (1926).

Sky Survey (`http://www-gsss.stsci.edu/DSS/dss_home.htm`), the USNOFS Catalogue Archive operated by the United States Naval Observatory, Flagstaff Station (`http://www.nofs.navy.mil/data/fchpix/`). This work is partly supported by a Research Fellowship of the Japan Society for the Promotion of Science for Young Scientists (MU), and by a grant-in-aid [13640239, 15037205 (TK), 14740131 (HY)] from the Japanese Ministry of Education, Culture, Sports, Science and Technology.

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