



## NRC Publications Archive Archives des publications du CNRC

### **A nearby world** Tapping, Ken

This publication could be one of several versions: author's original, accepted manuscript or the publisher's version. / La version de cette publication peut être l'une des suivantes : la version prépublication de l'auteur, la version acceptée du manuscrit ou la version de l'éditeur.

For the publisher's version, please access the DOI link below. / Pour consulter la version de l'éditeur, utilisez le lien DOI ci-dessous.

#### **Publisher's version / Version de l'éditeur:**

<https://doi.org/10.4224/23004788>

*Skygazing: Astronomy through the seasons, 2018-11-27*

#### **NRC Publications Record / Notice d'Archives des publications de CNRC:**

<https://nrc-publications.canada.ca/eng/view/object/?id=db947035-2bdb-4158-a19d-f58a10cc0ea4>

<https://publications-cnrc.canada.ca/fra/voir/objet/?id=db947035-2bdb-4158-a19d-f58a10cc0ea4>

Access and use of this website and the material on it are subject to the Terms and Conditions set forth at

<https://nrc-publications.canada.ca/eng/copyright>

READ THESE TERMS AND CONDITIONS CAREFULLY BEFORE USING THIS WEBSITE.

L'accès à ce site Web et l'utilisation de son contenu sont assujettis aux conditions présentées dans le site

<https://publications-cnrc.canada.ca/fra/droits>

LISEZ CES CONDITIONS ATTENTIVEMENT AVANT D'UTILISER CE SITE WEB.

**Questions?** Contact the NRC Publications Archive team at

PublicationsArchive-ArchivesPublications@nrc-cnrc.gc.ca. If you wish to email the authors directly, please see the first page of the publication for their contact information.

**Vous avez des questions?** Nous pouvons vous aider. Pour communiquer directement avec un auteur, consultez la première page de la revue dans laquelle son article a été publié afin de trouver ses coordonnées. Si vous n'arrivez pas à les repérer, communiquez avec nous à PublicationsArchive-ArchivesPublications@nrc-cnrc.gc.ca.



## A NEARBY WORLD

**Ken Tapping, 27<sup>th</sup> November, 2018**

When we first rode in a car or train, one thing that we immediately noticed was that things nearby flash past while distant things move through our field of view more slowly. The same thing applies to stars. Back in 1916, American astronomer E.E. Barnard was comparing images taken years apart. Over such a short interval of time one would expect the star positions to be unchanged, and the only moving things to be objects in our Solar System. However, he noticed that one star had changed position. Applying the car and train ride philosophy, he concluded that this star must be very close to us – by interstellar standards.

Its distance was measured using the parallax method. This is a process of measuring how much the position of a nearby object changes when seen from another position. This is how our eyes measure distances, and is one of the reasons we have two eyes. Look at a scene where there are nearby objects against a distant background. Now look with one eye and then the other. That position change is how our brain estimates distances.

We can do the same thing to measure the distance of nearby stars against the background of more distant ones. However, in this case, because stars are so distant, we need our “eyes” to be as far apart as possible. So a picture was taken of the star against the background stars, and then six months later, when the Earth was on the opposite side of the Sun, about 300 million kilometres from where the first image was made, the observation was repeated. The distance can be calculated from the apparent change in position. It turned out that the star Barnard had discovered lies very close to us by cosmic standards, a mere six light years. At a speed of 500 km/s, which is a speed that may be reachable using current spacecraft technology, it would take almost 2 million years to get there. However, its course is converging on ours, and in the year 11,800 the star will pass within 3.85 light years.

Barnard’s star, as it is now officially named, is a very small, red dwarf star, so dim we need a telescope to see it. Despite its low mass, it is so miserly with its energy output that its lifetime will be far longer than that of the Sun. It is between 7 and 12 billion years old, compared with our Sun’s age of 4.5 billion years, and may last as long again. There will be plenty of time for life to develop on any planets it might happen to have.

This month it was reported that Barnard’s star does have at least one planet. It is about 3.2 times the mass of the Earth, and orbits at a distance of about 40% of the Earth’s distance from the Sun (150 million kilometres). However, because Barnard’s star is so dim, with an energy output about 0.04% that of the Sun, even at that close distance the planet will be very cold. If it has an atmosphere, it could be rather like Saturn’s moon Titan, a body with methane rain and oceans of liquid hydrocarbons. When the Earth formed, it had an atmosphere containing similar organic chemicals. Of course, our world was a lot warmer, with oceans of water. Could there be life there on Titan or on Barnard’s Star’s frigid planet?

Experience with exotic forms of life here on Earth, including insects living in polar snows, creatures living in almost boiling hot springs or in the rocks far underground, suggests we had better not make too many firm statements about where or where not we might expect to find life. There is one thing we can be sure of. If, through some miracle of travel technology, we actually one day get to meet a being from that planet, shaking hands would be a very bad idea for both parties.

Saturn lies low in the sunset glow. Red Mars, fading in brightness as it gets further from us, lies low in the southern sky. Venus shines brightly, low in southeast before dawn. . The Moon will reach Last Quarter on the 29<sup>th</sup>.

**Ken Tapping is an astronomer with the National Research Council's Dominion Radio Astrophysical Observatory, Penticton, BC, V2A 6J9.**

**Tel (250) 497-2300, Fax (250) 497-2355**

**E-mail: [ken.tapping@nrc-cnrc.gc.ca](mailto:ken.tapping@nrc-cnrc.gc.ca)**

