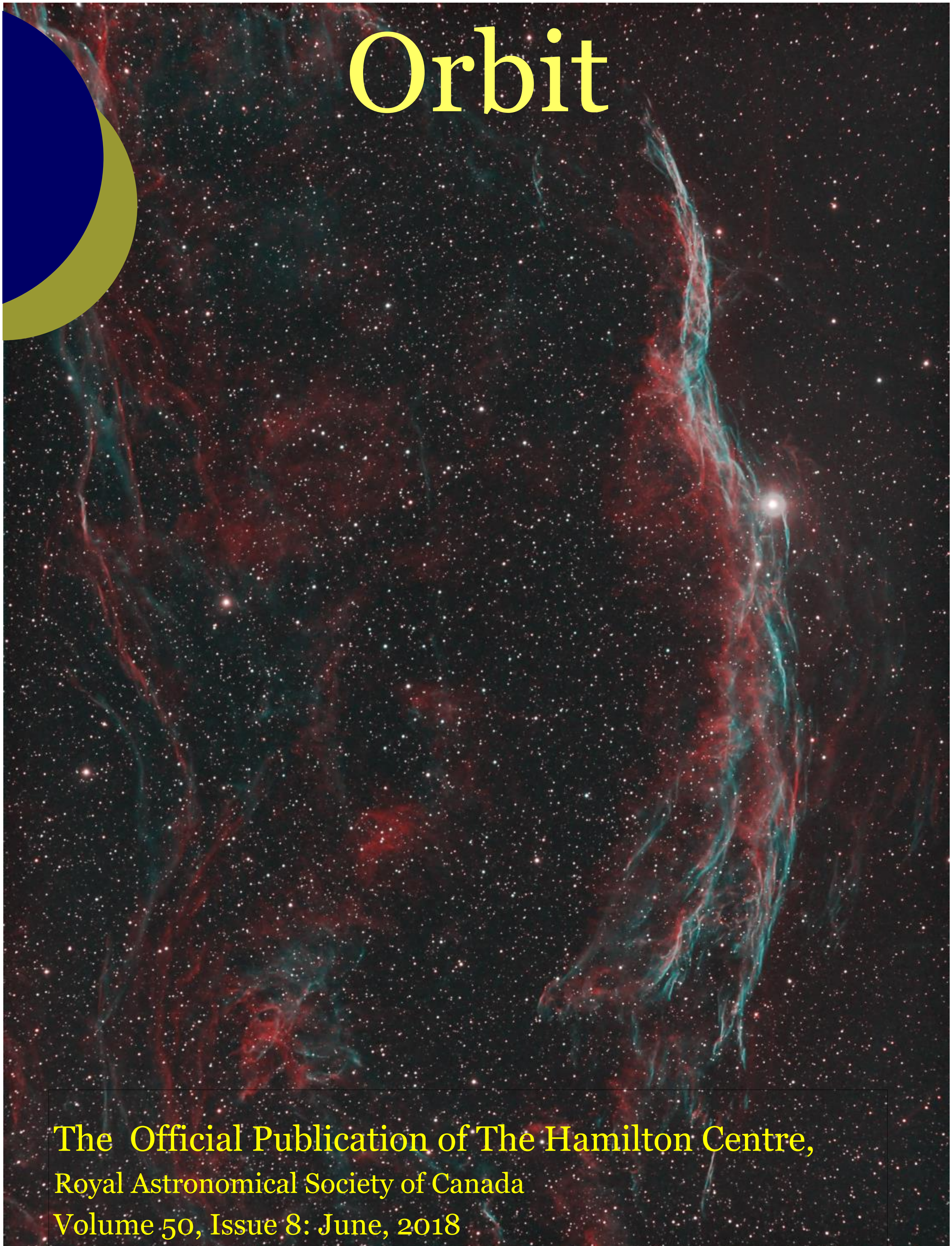
Orbit



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Issue Number 8, June, 2018
Roger Hill, Editor

First, off...welcome back, everyone. It's been a good couple of months for me. We had the anniversary of the great eclipse of 2017, which brought back some incredible memories, as I hope it did for you, too. Secondly, I'm hoping it is now less than a year until my next view of the solar corona, as I'll be off with Les Nagy and his wife to Chile for the July 2nd event there. Also of import, to me, at least, was that my daughter got married on August 11th, and there will be a shindig in London (England), where she lives, on September 1st. I'll be going to that, and staying for a couple of weeks, so I'll be missing both the September General meeting ,and the Board meeting a week later. I've stated my intention to offer my services to the Board for the 2018/19 membership year, and if no-one else wants the job, I'll do Orbit for another year.

Speaking of the Board...If you will have been a member of the Centre for more than 1 year by October 1st, 2018, then go to page 13 in this edition of Orbit, and print it off. Then, print your name right after it says "do hereby nominate", and again in the 2nd paragraph between where it says "I" and "being a member in good standing". Next, sign just above where it says Signature of nominee, and insert the date in the form 2018/mm/dd.

If you do this at a meeting (General, or Board), it will be easy to find someone to fill in the Nominator's portions of the form. If not, scan in the partially filled in form and then email the PDF to me. I'll happily be the Nominator. I'll then scan in the completed form and send it off to the secretary (Chris Talpas). Completed forms can be given to Chris.

I should add, that if you'd like to be our National Rep, then fill out the third portion.

I've said it often enough in these pages that a big Board allows the Centre to be able to do all manner of great things. For instance, I think we've done more public outreach this past year than we've done for quite a few years. A lot of this has to do with our dynamic duo of Ed Mizzi and Bob Prociuk. We've also started the Heavy METUL nights (next one will be in October...more on this later), and there's a rumour of a return of AstroCATS in a modified form. As well, some of you may remember the 17.5" scope that was on a fork mount in the Chilton Building for so many years. I understand that Eric Golding will be finishing off the project to rebuild this venerable 'scope as a beautiful Dobsonian. We've also seen some other initiatives, too, which are also due to having a large Board.

So...please don't leave everything to other people, join the Board and help us move forward.

I've bought another telescope. Because there is considerable debate as to what is the optimal number of scopes to have, and what purposes they need to serve, I bought Gary Colwells Vixen VMC110L. Vixen has an enviable reputation for excellent optics and very good quality work. It was Vixen who started off the small GEM mounts that are now ubiquitous. Theirs was called the Great Polaris Mount, and it was so good, that many companies have copied it. Their optics, too, are excellent, and the VMC110L is also heir to the same care and attention to detail. The scope is a 110mm aperture f/9.4, giving a focal length of 1035mm. It's a version of a Maksutov, but in this case the corrector is not at the front of the scope, but is a double-pass lens in front of the secondary. I had it out for a few minutes a couple of nights ago, and it is a joy to use. The image is nice and crisp, and I did not see any mirror shift when focusing.

So, I have a 300mm diameter F/10 Schmidt Cassegrain, a 150mm f/9 Ritchey-Chretien and now a 110mm modified Maksutov. Why did I buy it? Because it weighs less than 2 kg and I wanted something with about 1000mm focal length for the eclipse in Chile next year. I was also impressed by some of Gary Colwells eclipse pictures, so I knew the optics were decent. I'm also hoping that the focal reducer I use with my Ritchey-Chretien will also work, so I'll end up with an 750mm F/7 (or thereabouts) telephoto lens. I also wouldn't mind a lighter grab and go 'scope!

So that's all for now,

See you in the dark,

Roger

The front cover picture is from Chris Talpas, who took advantage of the power of narrowband imaging under a Gibbous moon in July of last year. He got a bit over 3 hours of integration time between Ha and OIII.

Coping with the Scope of Death by Wes Stone

I own the Scope of Death, the telescope that nightmares are made of. It sits in my room, daring me to take it out on a clear, dark night. I swear it would whisper a hex on me and my new scope should I ever come to my senses and replace it. This is the story of an amateur astronomer gone mad, and his telescopic partner in insanity.

The SOD, ready for a successful observation of Mercury's transit of the Sun. No, the garbage can isn't where the scope ends up when I'm done.

The SOD is a 60mm refractor, a department store telescope in every sense of the word. It bears the Focal brand name, manufactured in Japan and imported by K-Mart. I was not its first victim. No, some thirty years ago, another poor soul must have brought it home from K-Mart for the princely price of $49.97. The original tag says so. Maybe it was a gift to a child or family member. Maybe it changed hands several times. In red ink, the box bore garage sale markdowns to $15.00. Whatever its history, the SOD did not simply sit and gather dust. It was used--and abused--extensively by the time my dad traded a box of rocks for it in 1984 and presented it to his astronomy-mad 12-year-old.

Abuse--how else can I characterize it? The multiple bumps and bangs on the dew shield, the objective lens missing from the little fake finder, the stripped threads on the star diagonal, the missing mid-power eyepiece? Most of all, the once halfway-sturdy mount shows signs of unspeakable brutality that can never be healed. The azimuth axis is doomed to wobble and backlash, assuring the scope will always be a pain to use.

And yet I tried. I tried in spite of the rough-ground Huygens eyepieces, the lack of a usable finder scope, the marginal optical integrity of the whole system. I don't remember much about those early years: a few looks at Jupiter, Saturn, Halley's Comet, double stars. "Astronomy quiz" time, when I asked my parents to try to find an easy object and pretended that I was the "teacher." I didn't know how cruel or warped I was back then.

High school came, and with it a move to the city. The SOD was relegated to taking up space in my room, the way so many similar scopes do on sets in TV shows. Yet, all the time it was planning its revival, its return. Four years later, when I moved back to the country for the summer, it only took a few days before I was staying up all hours of the night, hunting down deep sky objects with the SOD. You see, I had always had a mental block driven into me by childhood books. I believed my telescope wasn't good enough to show any but the brightest deep sky objects. I had only seen two galaxies (M31 and M33), a few globular clusters, two bright nebulae (M42 and M8), and one planetary nebula (M27). Most of my deep sky observing targets had been open clusters, because there were a lot of bright ones in the Messier catalog and because most of my observing was done in the winter. (Back in Jr. High days, I had to be in bed by 9pm most nights, even in summer when it wasn't dark yet.) Now, with all these bounds lifted and a certain mature confidence, I made my first extensive exploration of the deep sky and found nearly every object I looked for.

When I headed to college, the SOD stayed behind. The college owned a number of telescopes, all of which exceeded the specifications of my lowly refractor. Eventually, I got to use them, despite the rain and light pollution of Portland and the general low regard given to visual observing by head-in-the-clouds, butt-in-the-easy-chair academics. You wouldn't believe how easy it is to use a fork-mounted Schmidt-Cassegrain after you've survived the Scope of Death.

I managed to hang on at the observatory for a while after I graduated, but I spent progressively more time with the SOD. After all, I could take it out to a dark site at any time. Cooped up in the city, I learned to appreciate the dark country skies even more. My experience with larger instruments allowed me to find fainter and fainter objects with the SOD. By 1997, I had two decent eyepieces and a new star diagonal. Then Hale-Bopp happened, and I bought a nice pair of binoculars to enhance my viewing experience. The binocs wouldn't entirely supplant the SOD, but the message was clear: Someday, I'm going to buy a bigger scope, and there won't be room for both of you in the car. So, the binoculars will take over low-power, wide field duties.

At about that time, something funny happened. I was taking the scope to star parties, partly to show that you can see things with a small scope but partly to warn people away from SODs. But lots of people loved it. I got questions about price that I wasn't fully prepared to answer. If crowds hadn't been so large, I would have suggested potential victims try to find Jupiter with my scope. I have the patience and the magic touch that the SOD requires; most do not. In any case, I may have sent several people to their doom, and I'm sorry about that.

Currently, the SOD reigns supreme. I'm always looking at potential replacements, but haven't pulled the trigger yet. I'm worried that the gun might be pointed at me. **[OK, I finally did it. I took delivery of a Discovery 10" Dob in January, 2003. It's been fun. The SOD still gets out for an occasional romp, but is seriously outclassed in most respects.]** To seriously improve on the SOD's capability (ease of use notwithstanding) will cost an awful lot of money. What if I get a lemon? What if the magic and drive isn't there when I start pushing a new scope? What if tragedies befall expensive accessories? What if I decide the telescope I really need is one I can't afford? Most of all, is that a sinister laugh I hear, coming from my closet right now?

A Trip Through the Milky Way

By Jane Houston Jones and Jessica Stoller-Conrad

Feeling like you missed out on planning a last vacation of summer? Don't worry—you can still take a late summertime road trip along the Milky Way!

The waning days of summer are upon us, and that means the Sun is setting earlier now. These earlier sunsets reveal a starry sky bisected by the Milky Way. Want to see this view of our home galaxy? Head out to your favorite dark sky getaway or to the darkest city park or urban open space you can find.

While you're out there waiting for a peek at the Milky Way, you'll also have a great view of the planets in our solar system. Keep an eye out right after sunset and you can catch a look at Venus. If you have binoculars or a telescope, you'll see Venus's phase change dramatically during September—from nearly half phase to a larger, thinner crescent.

Jupiter, Saturn and reddish Mars are next in the sky, as they continue their brilliant appearances this month. To see them, look southwest after sunset. If you're in a dark sky and you look above and below Saturn, you can't miss the summer Milky Way spanning the sky from southwest to northeast.

You can also use the summer constellations to help you trace a path across the Milky Way. For example, there's Sagittarius, where stars and some brighter clumps appear as steam from a teapot. Then there is Aquila, where the Eagle's bright Star Altair combined with Cygnus's Deneb and Lyra's Vega mark what's called the "summer triangle." The familiar W-shaped constellation Cassiopeia completes the constellation trail through the summer Milky Way. Binoculars will reveal double stars, clusters and nebulae all along the Milky Way.

Between Sept. 12 and 20, watch the Moon pass from near Venus, above Jupiter, to the left of Saturn and finally above Mars!

This month, both Neptune and brighter Uranus can also be spotted with some help from a telescope. To see them, look in the southeastern sky at 1 a.m. or later. If you stay awake, you can also find Mercury just above Earth's eastern horizon shortly before sunrise. Use the Moon as a guide on Sept. 7 and 8.

Although there are no major meteor showers in August, cometary dust appears in another late summer sight, the morning zodiacal light. Zodiacal light looks like a cone of soft light in the night sky. It is produced when sunlight is scattered by dust in our solar system. Try looking for it in the east right before sunrise on the moonless mornings of Sept. 8 through Sept 23.

You can catch up on all of NASA's current—and future—missions at www.nasa.gov

This illustration shows how the summer constellations trace a path across the Milky Way. To get the

*This article is provided by **NASA Space Place**. With articles, activities, crafts, games, and lesson plans, NASA Space Place encourages everyone to get excited about science and technology. Visit **spaceplace.nasa.gov** to explore space and Earth science!*

Earth has more moons than you might think—BigThink

For nearly four billion years, Earth and the Moon have been inseparable as they've journeyed together through the cosmic void. It's our only permanent satellite we'll ever know. But new research has unearthed (...unmooned?) evidence that our planet occasionally captures "mini-moons" every once in a while. These tiny asteroids zoom around our planet as temporary natural satellites.

The implications for this carries with it scientific and even commercial opportunities for our new space-age renaissance. A cadre of astronomers and scientists reviewed the history, properties and future potential that these mini-moons will have in a number of fields, scientific disciplines, and markets. These natural objects are referred to as either temporarily captured objects (TCO) or temporarily captured flybys (TCF.) The researchers stated that their inspiration for the name came from **Austin Powers**:

> *"As an homage to the Moon and Austin Powers we usually refer to TCOs and TCFs as "mini-moons" though, to be more precise based on their relative diameters, they may more accurately be considered micro-moons."*

How it was discovered

The existence of mini-moons was thought to be unlikely by a number of astronomers and even impossible because current data and asteroid surveys had shown no sign of natural geocentric objects in orbit. It's possible that due to the incredibly small relative size of these objects, which are often moving too fast and are sometimes faulty labeled artificial – the discovery of mini-moons had continued to elude us.

Our Moon is roughly a quarter the size of our planet, which makes mini-moons infinitesimally small in comparison. These fast-moving and transient objects are difficult to detect, even though there may be loads of them floating around the planet. Mini-moons usually measure anywhere from 3 to 10 ft in diameter. Sometimes they'll elope with our orbit for just a quick swing before going right back to revolving around the sun. There is still a lot to learn about these objects.

Twelve years ago, the first and only other mini-moon was detected by astronomers by the Catalina Sky Survey organization. It was named 2006 RH120 and measured to be 6 to 10 ft in length. It's thought to enter Earth's orbit around every 20 years. It remains our only known mini-moon for now.

There was some controversy over the nature of the object after discovery on whether or not it was another artificial object or really the first natural object known to be orbiting us besides the moon. From the white paper of the study:

> *"Several launch vehicle booster stages have achieved sufficient speed for them to escape the gravitational bonds of the EMS only to be subsequently recaptured in the system after a few decades. Subsequent astrometric observations of 2006 RH120 established its provenance as a natural object because the perturbations to its trajectory caused by solar radiation pressure were inconsistent with it being artificial."*

It's expected that in the near future, advances in astronomical surveys will allow us to discover even greater quantities of mini-moons.
According to the researchers, there are a few more ways to detect these objects in the future:

- Options for establishing a candidate as natural include obtaining spectra or colors, radar observations, or measuring its area-to-mass ratio (AMR) based on the magnitude of the effect of solar radiation pressure on its trajectory.
- Obtaining sufficiently high signal-to-noise ratio (SNR) spectra of small, faint, fast objects is notoriously difficult and even low-resolution color photometry could require large telescopes and a disproportionate amount of observing time.
- Radar observations can quickly establish an object's nature as the radar albedo easily differentiates between a natural rocky surface and the highly reflective surface of an artificial object

Discovering a little teeny mini-moon might seem minuscule, but this research might help us better understand the nature of asteroids around the solar system, Earth-to-moon system relations and a whole host of other commercial and celestial data.

What are the implications of mini-moon research?

To say there's a lot we still don't know about the universe is an understatement, a phenomenon in our own extraterrestrial backyard is still shrouded in mystique. One thing we could learn from the study of mini-moons is the interior structure of meteoroids and asteroids. The range of different hypotheses on the insides of asteroids of any size varies significantly. The authors of the study state:

> "There is essentially no data to constrain models that range from 'sandcastles' held together by cohesive forces to solid, monolithic structures."

Meteorites that crash to Earth only give us a slight picture of what constitutes an asteroid. The Earth's atmosphere strips away a lot of material contained within and on the objects. Mini-moons could become new quick destinations for space missions, where we could grab them and go back to earth without worrying about the effects of atmospheric forces.

Before we start studying and sourcing these mini-moons, we first have to have a way to detect and find them. Currently, there is a telescope being constructed in northern Chile called the Large Synoptic Survey Telescope (LSST) – this telescope is up to the task of mini-moon sighting.

The authors of the paper believe that mini-moons will lead us to a number of new places that will benefit research and commerce:

(1) The development and testing of planetary defense technologies (e.g., deflecting an asteroid)
(2) Validating and improving close-proximity guidance, navigation, and control algorithms
(3) Testing close-proximity procedures and protocols for safe operation of crewed missions around asteroids
(4) Establishing the feasibility of asteroid mining technologies for future commercial applications, all in an environment where the round-trip light-time delay is a few seconds. This short list illustrates that minimoons have far-reaching non-science implications for different stakeholders.

Once we begin discovering and tracking mini-moons at a greater rate, we can send out satellite missions for either retrieval or study. These cheaper missions will be a great way to help jumpstart a soon to be burgeoning space mining industry.

The many moons in our Solar System

As we one day begin to recognize more mini-moons and add them to the local neighborhood, we should be able to understand what constitutes the classification of a "moon." Our planet is at the top of the list when it comes to the primary planet to satellite mass ratio. In general, the term moon denotes an object that is orbiting something other than the main star in the solar system. So in this regard, our moon is similar to the moons circling Mars, Jupiter or other planets. Moons are not determined by what they're made out of, their size, or mass.

We determine what makes a moon by the way it moves throughout the solar system and what its relation is to other celestial bodies. For example, classification by motion allows us to determine the dynamics of our solar system by looking at the gestalt of movement, rather than categorizing by an arbitrary division.

Our moon's composition is similar to the other four terrestrial planets in the inner circle of the sun: Mercury, Venus, Earth, and Mars. All of these planets have rocky surfaces and geological layers. But this doesn't mean that the Moon can be classified as a terrestrial planet – again this is determined by motion.

A planet can gather a number of natural satellites through the force of its gravity. Other planets in our solar system have a whole load of big moons. For example, Jupiter has 79 confirmed moons and Saturn has 62 confirmed moons.

Jupiter's Ganymede is larger than both Mercury and Pluto and 2/3rds the size of Mars, but again it orbits Jupiter so it is considered a moon.

The moons of our solar system and mini-moons of Earth may one day prove to be the literal stepping stones for the rest of the galaxy.

Supersharp images from new VLT Adaptive Optics

ESO's Very Large Telescope (VLT) has achieved first light with a new adaptive optics mode called laser tomography — and has captured remarkably sharp test images of the planet Neptune, star clusters and other objects. The pioneering MUSE instrument in Narrow-Field Mode, working with the GALACSI adaptive optics module, can now use this new technique to correct for turbulence at different altitudes in the atmosphere. It is now possible to capture images from the ground at visible wavelengths that are sharper than those from the NASA/ESA Hubble Space Telescope. The combination of exquisite image sharpness and the spectroscopic capabilities of MUSE will enable astronomers to study the properties of astronomical objects in much greater detail than was possible before.

The MUSE (Multi Unit Spectroscopic Explorer) instrument on ESO's Very Large Telescope (VLT) works with an adaptive optics unit called GALACSI. This makes use of the Laser Guide Star Facility, 4LGSF, a subsystem of the Adaptive Optics Facility (AOF). The AOF provides adaptive optics for instruments on the VLTs Unit Telescope 4 (UT4). MUSE was the first instrument to benefit from this new facility and it now has two adaptive optics modes — the Wide Field Mode and the Narrow Field Mode.

The MUSE Wide Field Mode coupled to GALACSI in ground-layer mode corrects for the effects of atmospheric turbulence up to one kilometre above the telescope over a comparatively wide field of view. But the new Narrow Field Mode using laser tomography corrects for almost all of the atmospheric turbulence above the telescope to create much sharper images, but over a smaller region of the sky .

With this new capability, the 8-metre UT4 reaches the theoretical limit of image sharpness and is no longer limited by atmospheric blur. This is extremely difficult to attain in the visible and gives images comparable in sharpness to those from the NASA/ESA Hubble Space Telescope. It will enable astronomers to study in unprecedented detail fascinating objects such as supermassive black holes at the centres of distant galaxies, jets from young stars, globular clusters, supernovae, planets and their satellites in the Solar System and much more.

Adaptive optics is a technique to compensate for the blurring effect of the Earth's atmosphere, also known as astronomical seeing, which is a big problem faced by all ground-based telescopes. The same turbulence in the atmosphere that causes stars to twinkle to the naked eye results in blurred images of the Universe for large telescopes. Light from stars and galaxies becomes distorted as it passes through our atmosphere, and astronomers must use clever technology to improve image quality artificially.

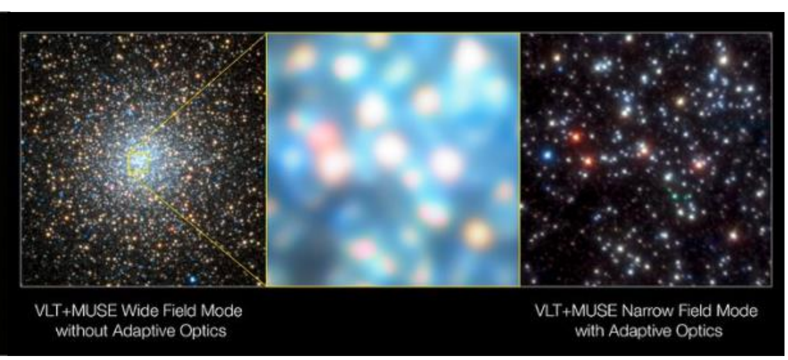
To achieve this four brilliant lasers are fixed to UT4 that project columns of intense orange light 30 centimetres in diameter into the sky, stimulating sodium atoms high in the atmosphere and creating artificial Laser Guide Stars. Adaptive optics systems use the light from these "stars" to determine the turbulence in the atmosphere and calculate corrections one thousand times per second, commanding the thin, deformable secondary mirror of UT4 to constantly alter its shape, correcting for the distorted light.

MUSE is not the only instrument to benefit from the Adaptive Optics Facility. Another adaptive optics system, GRAAL, is already in use with the infrared camera HAWK-I. This will be followed in a few years by the powerful new instrument ERIS. Together these major developments in adaptive optics are enhancing the already powerful fleet of ESO telescopes, bringing the Universe into focus.

This new mode also constitutes a major step forward for the ESO's Extremely Large Telescope, which will need Laser Tomography to reach its science goals. These results on UT4 with the AOF will help to bring ELT's engineers and scientists closer to implementing similar adaptive optics technology on the 39-metre giant.

These images of the planet Neptune were obtained during the testing of the Narrow-Field adaptive optics mode of the MUSE/GALACSI instrument on ESO's Very Large Telescope. The image on the right is without the adaptive optics system in operation and the one on the left after the adaptive optics are switched on.

Credit:ESO/P. Weilbacher (AIP)



These images of the globular star cluster NGC 6388 were obtained during the testing of the Narrow-Field adaptive optics mode of the MUSE instrument on ESO's Very Large Telescope. The image on the left is from MUSE in Wide Field Mode, without the adaptive optics system in operation and the centre panel is an enlargement of a small part of this view. The image on the right is the view from the Narrow-Field Mode of MUSE when adaptive optics are switched on.

Credit:ESO/S. Kammann (LJMU)

Obsolete Constellation: Antinous From Ian Ridpath

Antinous (pronounced 'anti-no-us') was the boy lover of the Roman Emperor Hadrian and hence is a real character, not a mythological one, although the story reads like fiction. Antinous was born c. AD 110 in the town of Bythinium (also called Claudiopolis), near present-day Bolu in north-western Turkey. At that time this area was a Roman province, and Hadrian is thought to have met Antinous during an official visit. Hadrian, the first openly gay Roman Emperor, was smitten by the boy and groomed him to become his constant companion.

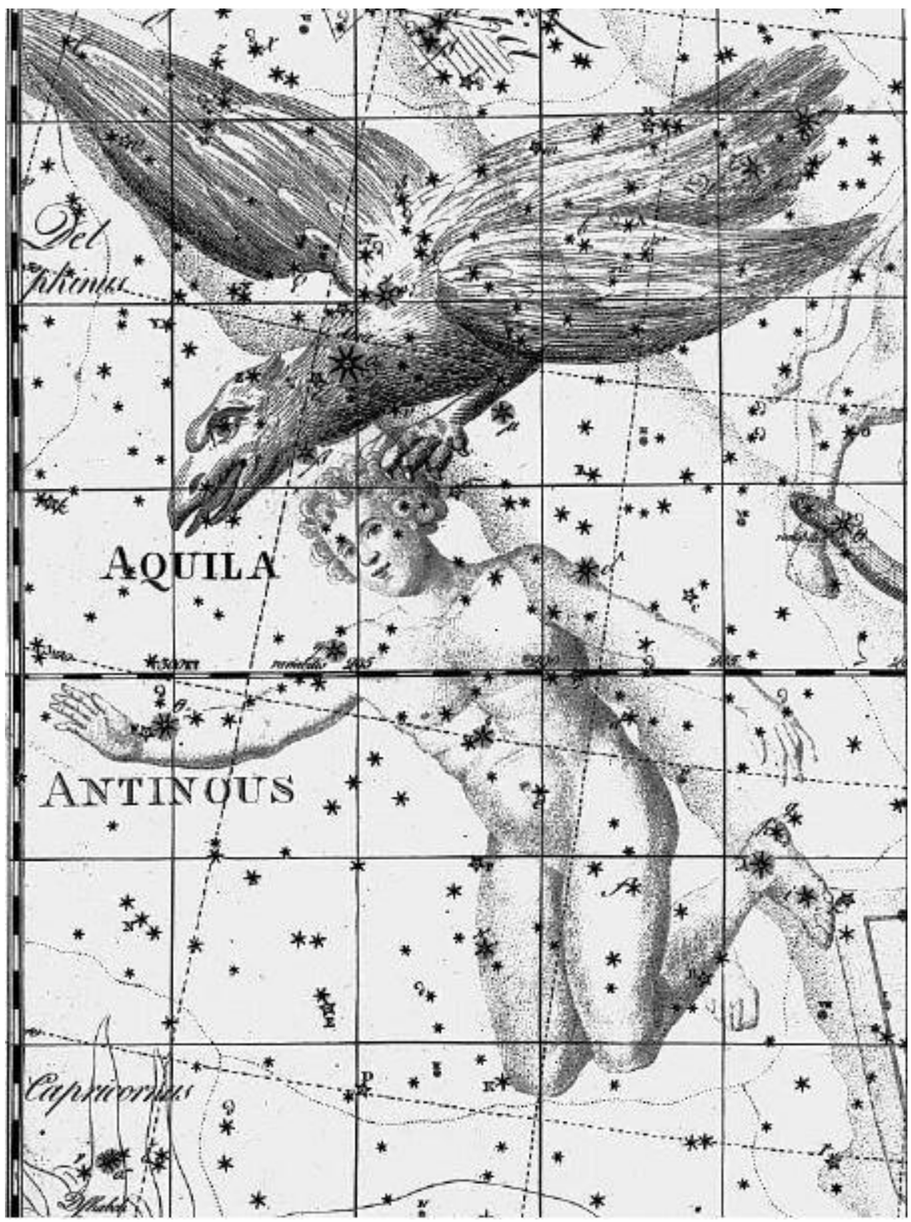
Hadrian's happiness did not last long, though. While on a trip up the Nile in AD 130, Antinous drowned near the present-day town of Mallawi in Egypt. Supposedly an oracle had predicted that the Emperor would be saved from danger by the sacrifice of the object he most loved, and Antinous realized that this description applied to him.

Whether the drowning was accident, suicide, or even ritual sacrifice, Hadrian was heartbroken by it. He founded a city called Antinoöpolis near the site of the drowning, declared Antinous a god, and commemorated him in the sky from stars south of Aquila, the Eagle, that had not previously been considered part of any constellation.

Antinous was mentioned as a sub-division of Aquila in Ptolemy's Almagest, although it is not included among the canonical 48 Greek figures. Ptolemy worked at Alexandria at the mouth of the Nile and he compiled the Almagest about 20 years after the famous drowning so he would have known the story; indeed, he might have had a hand in creating the constellation, possibly at Hadrian's request. According to Ptolemy, Antinous consisted of six stars, which we now know as Eta, Theta, Delta, Iota, Kappa, and Lambda Aquilae.

The constellation's first known depiction was in 1536 on a celestial globe by the German mathematician and cartographer Caspar Vopel (1511–61); it was shown again in 1551 on a globe by Gerardus Mercator. Tycho Brahe listed it as a separate constellation in his star catalogue of 1602 and it remained widely accepted into the 19th century, when it was eventually remerged with Aquila.

Antinous was depicted being carried in the claws of Aquila. Hence he has sometimes been confused with Ganymede who was carried off by an eagle for Zeus.



(Right)
Antinous carried in the claws of Aquila the Eagle, seen on Chart IX of the Uranographia of Johann Bode (1801). Here, the eagle is shown in a rather awkward perspective, from above. However, Ptolemy's description in the Almagest makes it clear that the eagle should be imagined as though seen from below, which is how the classically correct John Flamsteed showed it on his Atlas Coelestis, although without the burden of Antinous.

46P/Wirtanen—a Late Fall naked eye comet?

We may have a nice comet coming towards us during the Fall.

Comet 46P/Wirtanen begins its apparition (magnitude 10.5) along the Cetus–Fornax border in the late September morning sky. Before heading north, it slips further south, reaching declination –33° on November 1st but pumping up to magnitude 7, within easy binocular range. About mid-November, 46P launches straight north with ever-increasing speed, rocketing in brightness and altitude until it towers in Taurus in all of its 4th-magnitude glory two weeks before Christmas. Comet 46P's exceptionally close approach to Earth of 11.5 million km on December 16th could mean several weeks of naked-eye visibility from dark skies.

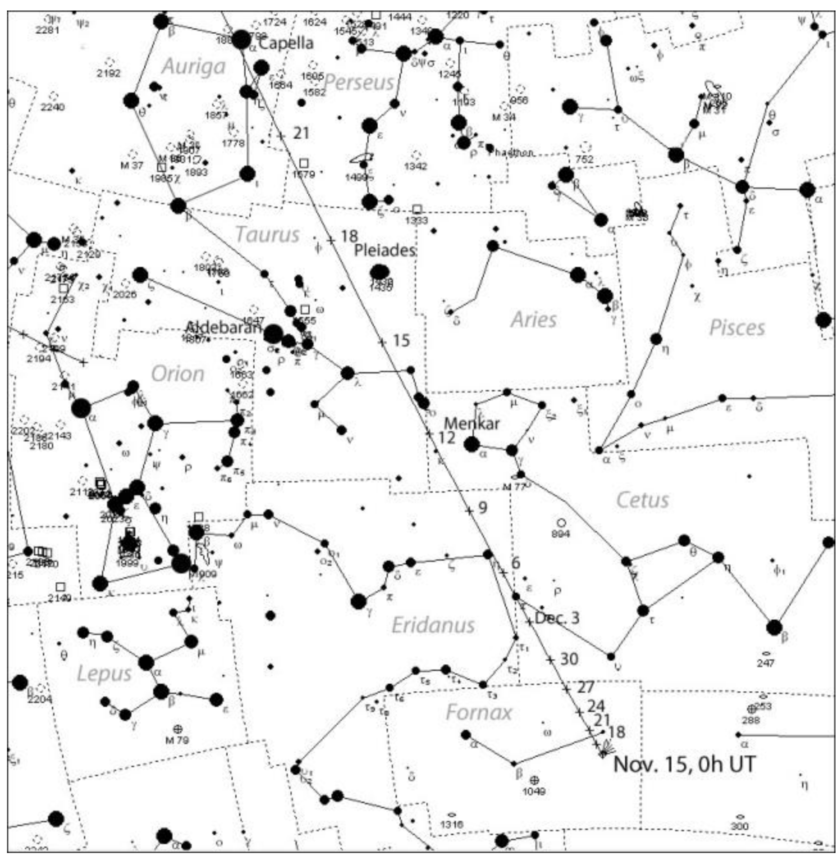
Comet Wirtanen is intrinsically bright, comes closest to our planet just four days after perihelion, *and* remains visible all night, making this an exceptional apparition. That's why it's the focus of the Planetary Science Institute's 4*P Coma Morphology Campaign. For more information on this, go to https://www.psi.edu/41P45P46P .

PSI goes on to say "If your images are of sufficient quality (e.g., good signal-to-noise) to be used in our analysis, we will recognize your efforts by you being a co-author of any resultant publications. The success of this campaign will depend on multiple images taken from different sites throughout the world and we appreciate your efforts."

So...what are they looking for?

They are looking for good signal-to-noise CCD images of the head of the comet taken with professional or amateur-accessible telescopes. If your system can track the comet well without trailing, that will be ideal. Otherwise, you may be able to increase signal-to-noise by co-adding multiple images of short exposures, where the comet is trailed less than the seeing disk (co-adding should be carried out to compensate for comet motion so the comet will not be trailed). We would like to have the co-added image(s) as well as the individual images used for co-adding (if the latter are available).

Any number of images from a given site on any given night will help this project (i.e., there is no set minimum number of images but at least two images from a given site on a given night are desirable).



- They are aiming at images showing the continuum signature or specific gas species (note latter requires comparatively larger telescopes). Even images taken without a filter could be useful. We especially like images taken with the following filters: R, V, clear or no filter, CN filter (please see below for a "CN filter" from Semrock, in case you do not have HB or ESA narrowband filters). Generally, images need to be enhanced to identify the coma structure and we will carry out that task.
- They are concentrating on the near-nucleus coma and therefore a field-of-view of about 10 arcmin X 10 arcmin should be sufficient. A somewhat smaller or a larger field-of-view (say one which differs by a factor two or three) is ok.
- While better seeing is desirable, even images having about 3 arcsec seeing could be useful provided that those images have good signal-to-noise.
- Ideally the pixel scale should be smaller than the seeing.
- Images with unsaturated centre pixels (opto-centres) are preferred. Saturated images could be useful under certain circumstances, especially if a saturated image is accompanied by a shorter exposure unsaturated image (to provide a comparison and fill in the saturated portions).
- Ideally they want the images to be in the FITS format.
- Ideally images should have north and east oriented such that they are parallel to either X or Y axes of the images (e.g., north up and east left).
- They need unenhanced images; however, they should be bias subtracted and flat-fielded (and if necessary, dark corrected). Absolute flux calibrations using standard stars are not required but if you have standard star fields you may submit them too.

1. What kind of images do they need?
Continuum (dust) images as well as gas (e.g., CN) images with good signal-to-noise (but with an unsaturated opto-center) are desired when the comet will be highly active (< 1.5AU from the Sun).

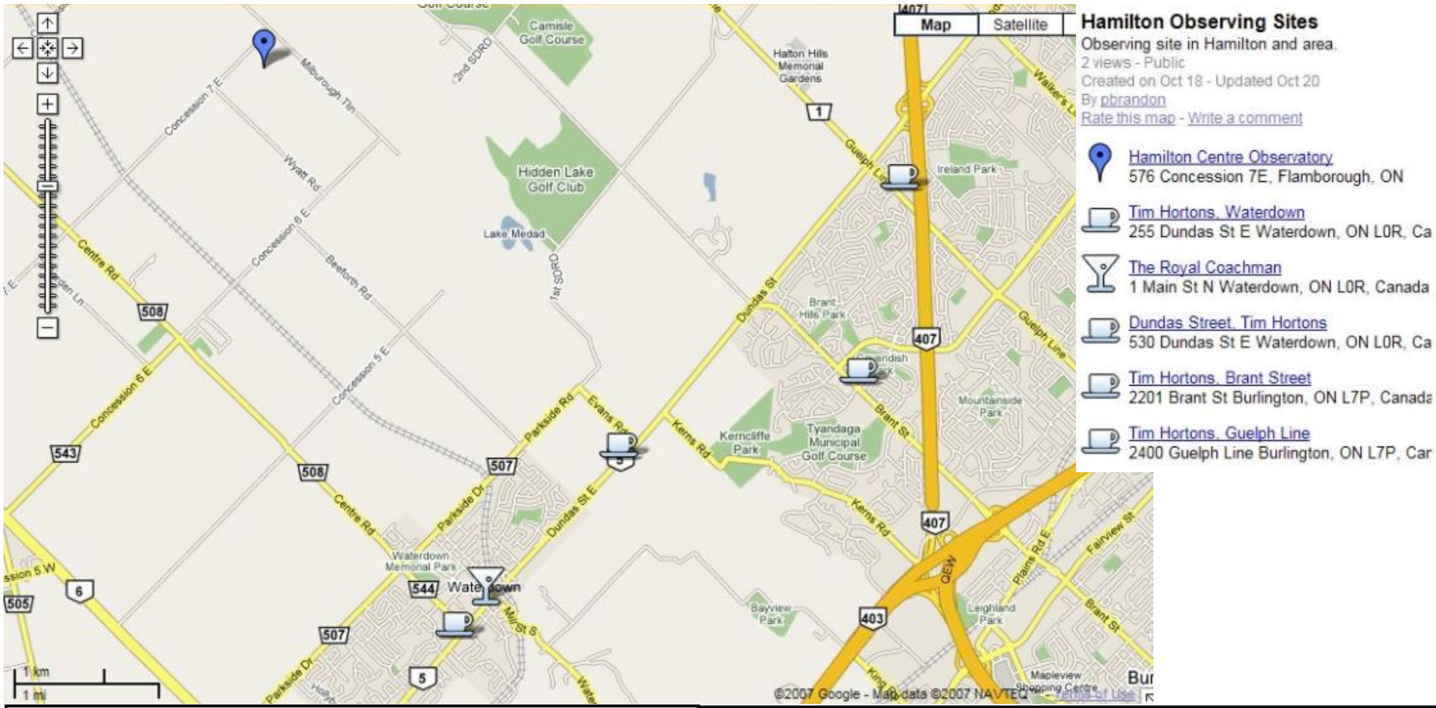
There is no need for absolute flux-calibrated images for morphology studies, but they do encourage calibrations for those that are able, as calibrated data can be used in other studies. If the basic image reductions (e.g., bias subtraction, flat fielding) can be carried out by the observer, that will be appreciated. Even if no flat fields were taken, still your images may be of help. Ideally, the comet should be guided non-sidereally and at the comet's rate of motion. When, non-sidereal guiding is not feasible, co-adding a number of un-trailed short exposures of the comet taken close in time could yield a good signal-to-noise image. You may submit both raw images, flat fields, dark frames etc as well as the reduced images. BUT PLEASE DO NOT PERFORM ANY IMAGE ENHANCEMENTS.

2. What do you gain?
Observations with sufficient signal-to-noise that could be used in any publication resulting from this study will be acknowledged with co-authorship for the observers similar to our publication that resulted from the Global Coma Morphology Campaign for Comet ISON (Samarasinha et al., 2015, Planetary and Space Science, 118, 127-137; see http://adsabs.harvard.edu/abs/2015P%26SS..118..127S or http://www.sciencedirect.com/science/article/pii/S0032063315003050).

3. What can be learned from temporally well-sampled images showing coma morphology?
The science that can be extracted includes the rotational state of the nucleus, characterization of the nucleus' activity, characterization of outbursts, gas and dust properties in the coma (e.g., outflow velocities), chemical origin of gas species in the coma, and temporal behavior of the tail structure.

There has been talk in the last couple of years about doing some real science with the equipment we have, and this seems like an interesting project for those that want to try their hand at something that is normally done by professional observatories.

And the rest of us might get to see a nice naked eye comet!



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Orbit Editor	Roger Hill		

I grabbed this image from the Forum. Jeff Booth made an attempt at C33, the Eastern Veil—a supernova remnant discovered by William Herschel.

The data is from last September and October.

There were no calibration frames, so he did the best he could with what he could scrape together/ invent.

He said he was not too happy with this, but there’s a whole lot of people out there who could not produce as nice an image as this.

NOMINATION FORM for the Board of Directors - October, 2018.
I, __________________________ , being a member in good standing of the Royal Astronomical Society of Canada 1968, Hamilton Centre, do hereby nominate _____________________________ for election at the Annual Meeting.

_____________________________________ ________________________________
Signature of nominator and Date (2018/MM/DD)

I, _______________________, being a member in good standing of the Royal Astronomical Society of Canada 1968, Hamilton Centre and being at least 18 years of age, do hereby accept my nomination to the Board of Directors of the Royal Astronomical Society of Canada 1968, Hamilton Centre.

_____________________________________ ________________________________
Signature of nominee and date (2018/MM/DD)

NOMINATION FORM for National Council Representative - October, 2018.
I, _______________________, being a member in good standing of the Royal Astronomical Society of Canada, and of the Hamilton Centre, and being at least 21 years of age, do hereby accept my nomination for National Council Representative for the Royal Astronomical Society of Canada 1968, Hamilton Centre. (Two year term)

_____________________________________ ________________________________
Signature of nominee and Date (2018/MM/DD)

Bylaw Number One of The Royal Astronomical Society of Canada 1968, Hamilton Centre (September 13, 2005)
5.04 NOMINATIONS
Any member of the Centre may make nominations to the Board. Such nominations shall be submitted by the member to the Secretary of the Centre in writing at least ten (10) days before the annual meeting, and shall contain the name of the nominator and the written consent to the nomination by the nominee.

Bylaw Number One of The Royal Astronomical Society of Canada (February 2006)
4.07 CENTRE COUNCILS AND OFFICERS
(2) (2) Every member of the Centre Council shall be elected by the members of the Centre, for such term and in accordance with such procedure as is established by the Centre by-laws, at the Centre's annual meeting or at such other meeting as is duly called for that purpose.

4.08 NATIONAL COUNCIL REPRESENTATIVES
(2) Subject to Article 4.08(4), the National Council Representatives of a Centre shall be elected by the members of the Centre in accordance with the procedure established in Article 4.07(2) for the election of Centre Council members.
(4) If for any reason a National Council Representative of a Centre is unable to attend a meeting of the National Council, then the Council of the Centre may appoint another member of the Centre as an alternate for that National Council Representative. The alternate will be entitled to exercise all the rights of the National Council Representative for whom he or she is the alternate only upon presentation to the National Council of proof in writing from the President or Secretary of the Centre as to the due appointment of the alternate.