THE BAADER PLANETARIUM MORPHEUS™

by: *William A. Paolini, August 18, 2015*

The new Baader Morpheus eyepieces sport a wide 76º apparent field of view, comfortable eye relief, sealed watertight housings, and an optical design that provides sharp-to-the-edge performance even in fast focal ratio telescopes.

Fig 1: Baader's new Morpheus eyepieces -- precision optics, light weight, comfortable, engaging, and photo-visual ready.

1. OVERVIEW

The new Morpheus line of eyepieces from Baader Planetarium provide a level of performance well above their current Hyperions, and are a worthy "*big brother*" to that line. The Morpheus sport a long list of features which include: light weight, sealed watertight construction, immersive 76º apparent field of view (AFOV), generous eye relief that varies from 17.5mm to 21mm, a proprietary 8 element 5 group design incorporating rare-earth glasses, Baader's Phantom Coating® Group index-matched to each glass type, blackened lens edges, rubber grip ring, integrated M43 photo-visual threading, dual skirt design allowing them to be used in either 1.25" or 2" focusers, multiple eye guards (conventional and winged), multiple dust caps (to accommodate the multiple eyeguards), "safety-kerfs" instead of undercuts on the 1.25" and 2" barrels, photo-luminescent graphics to aid in identification in the dark, and a Cordura eyepiece holster with belt attachment.

Focal Length	AFOV	Eye Relief	Field Stop	Min Height (eyeguards down)	Max Width (housing)	Weight	Parfocal
4.5 mm	76°	17.5 mm	6.10 mm	127 mm	55 mm	13.0 oz	Yes
6.5 mm	76°	18.5 mm	8.75mm	122 mm	55 mm	12.3 oz	Yes
9 mm	76°	21.0 mm	12.10 mm	119 mm	55 mm	12.7 oz	Yes
12.5 mm	76°	20.0 mm	16.80 mm	109 mm	55 mm	12.2 oz	Yes
14 mm	76°	18.5 mm	18.85 mm	110 mm	55 mm	12.7 oz	Yes
17.5 mm	76°	19.0 mm	23.55 mm	104 mm	55 mm	13.9 oz	Yes

2. BUILD, FORM FACTOR AND FEATURES

Fig 2: Major build features of the Morpheus eyepiece.

The Morpheus eyepieces present a light weight, yet solid feeling construction. Given that the eyepieces have sealed watertight construction, no portion of the eyepiece separates or unscrews. The only access option is to remove the top eyeguard to replace with the supplied optional winged eyeguard or for access to the M42 photo-visual connector threads.

The soft rubber eye guard easily folds down for use with eyeglasses. There are multiple dust caps supplied so there is a secure fit if the eyeguard is up, down, or the optional winged eyeguard is used. In field use I sometimes preferred the eyeguard in the up position, and sometimes preferred it in the down position, and when using the Morpheus in a binoviewer I then preferred the supplied winged eyeguards instead. Overall I enjoyed their flexibility.

Removing the eyeguard reveals the M43 photo visual threads, used to attach optional photo accessories and cameras to the top of the Morpheus eyepieces. The rubber hand grip appears well made and robust, and each eyepiece provides a stock number that indicates the focal length group (i.e., all Morpheus of the same focal length will show the same stock number). All the graphics are photo-luminescent (i.e., they glow in the dark). In the field I found that after sitting a short while they would lose their glow, so I typically just closed my eyes to retain my dark adaptation and briefly shone a light on the graphics to re-energize them if I forgot what focal length I was working with.

Fig 3: M43 photo-visual threads under the eyeguard.

Finally, the dual skirted 1.25" and 2" barrels contained a feature called “safety-kerfs” instead of the always problematic safety undercuts found on many eyepieces. Personally, I consider the undercut and all its incarnations a defect rather than a feature since they inevitably get hung on

compression rings or cause improper seating when in binoviewers. The safety-kerfs I found only very minimally provided any additional safety if I did not tighten the eyepiece in the focuser. As a plus though, I can say that they did not impede the user or function of the eyepiece in any way, and allowed precise seating of the eyepiece, unlike undercut designs.

Fig 4: Morpheus eyepiece packaging.

The packaging of the Morpheus is an attractive box with cutout foam to hold the eyepiece. The eyepiece comes wrapped in a protective plastic pouch with a silica desiccant dehumidifier packet to minimize moisture. Removing the foam inset provides access to the standard accessories that come with each Morpheus. These accessories include: a second top dust cap, and extra paper box band to prevent the box from opening, the optional winged eyeguard, and the Cordura holster that can attach to your waist belt for easy access (note - Cordura is the brand name for a collection of fabrics known for their durability and resistance to abrasions, tears, and scuffs).

Fig 5: The Morpheus eye lenses from left to right; back row - 9mm, 6.5mm, 4.5mm; front row - 14mm, 12.5mm.

For all Morpheus focal lengths the eye lenses are a large 37mm in diameter. Coatings are richly colored and the glass appears highly polished, typical of premium brands. The eye lenses are all flat and are inset less than 1mm from the top housing allowing almost all available optical eye relief fully accessible, in addition to allowing easy cleaning. I was very pleased to see the special attention to seating the top of the eye lens very close to the top housing. Too often manufacturers create designs with long eye relief only to waste this advantage by seating the eye lens too far into the eyepiece housing.

Fig 6: The 9mm Morpheus field lens.

The field lenses of the Morpheus eyepieces vary from flat to concave to convex, depending on the focal length. A metal light baffle is also positioned over the field lens. This baffle, while blackened, is not a pure flat black but has the slight satin sheen typical of the rest of the eyepiece's construction. Field tests revealed that even though not the traditional flat black, it was still effective as no instances of flare or other light artifacts were encountered whether observing celestial targets, or conducting tests with very bright targets to try to induce a light control artifact. So its function was very effective. On closer examination there are also no cutouts or holes for a spanner wrench to remove these baffles. Given that the Morpheus line has sealed watertight construction, I am guessing that these baffles might provide some of the needed sealing function.

3. OBSERVATIONAL FIELD TESTS

Fig 7: The Baader Morpheus form factor compared to the Pentax XW eyepiece.

Observational testing was conducted in a suburban location in Northern Virginia, west of Washington, D.C., where the light pollution level varies between light to moderate, depending on the particulates and water vapor in the atmosphere. Limiting magnitudes at this location vary on Moonless nights from magnitude 4 to magnitude 6. For this review the Morpheus eyepieces were tested in a wide variety of telescopes:

- 10" Company Seven certified Orion XT10 f/4.7 Dobsonian reflector
- 8" Meade 2080 f/10 SCT
- 6" Lunt152 f/7.9 ED-Apochromat refractor
- 4" Takahashi TSA-102 f/8 Super Apochromat refractor
- 3" Vixen 81S f/7.7 Apochromat refractor

In the above telescopes the Morpheus was compared primarily to the Pentax XW line of eyepieces since their AFOV and eye relief characteristics are in the same class. However, for some specific test comparisons the Takahashi Abbe Orthos were also used for comparison.

3.a. STRAY LIGHT CONTROL AND SCATTER

Overall, all of the Morpheus showed an excellent level of light control. No ghosting, flare, or other unwanted stray light artifacts were observed regardless of where a bright celestial object was placed within or outside the field of view. The Moon, 0th-magnitude Vega and Arcturus, and Saturn were all placed at various points in the field of view, as well as just outside the field

stop. In all instances no unwanted light artifacts were observed throughout any of the testing in any of the telescopes.

Scatter was also nicely controlled in the Morpheus. Observing bright stars like Vega and Arcturus through the 152mm and 102mm Apochromat refractors, scatter appears just very slightly more than through a similar focal length Pentax XW or Takahashi Abbe Ortho. Moving to Saturn the results were similar, just very slightly more scatter, and not enough of a difference to impact in any apparent way the details on the planet.

3.b. OBSERVING COMFORT / ENGAGING CHARACTERISTICS

As my testing progressed each evening and I felt I had accomplished sufficient progress for the night, I stopped my testing and just observed for the remainder of the evening. In some ways, I think this was a more revealing test for the eyepieces. What I found is that I more often reached for a Morpheus rather than a XW because I was actually enjoying them more. And after all the testing the AFOV of the XWs started to feel constrained next to the larger, more engaging 76º of the Morpheus. When I compared the views through my 4.7mm Meade 5000 UWA to the 4.5mm Morpheus, the AFOVs actually appeared more similar in size than different. So the feel of the 76º AFOV was perceptually only minimally less than what the 82º eyepiece offered.

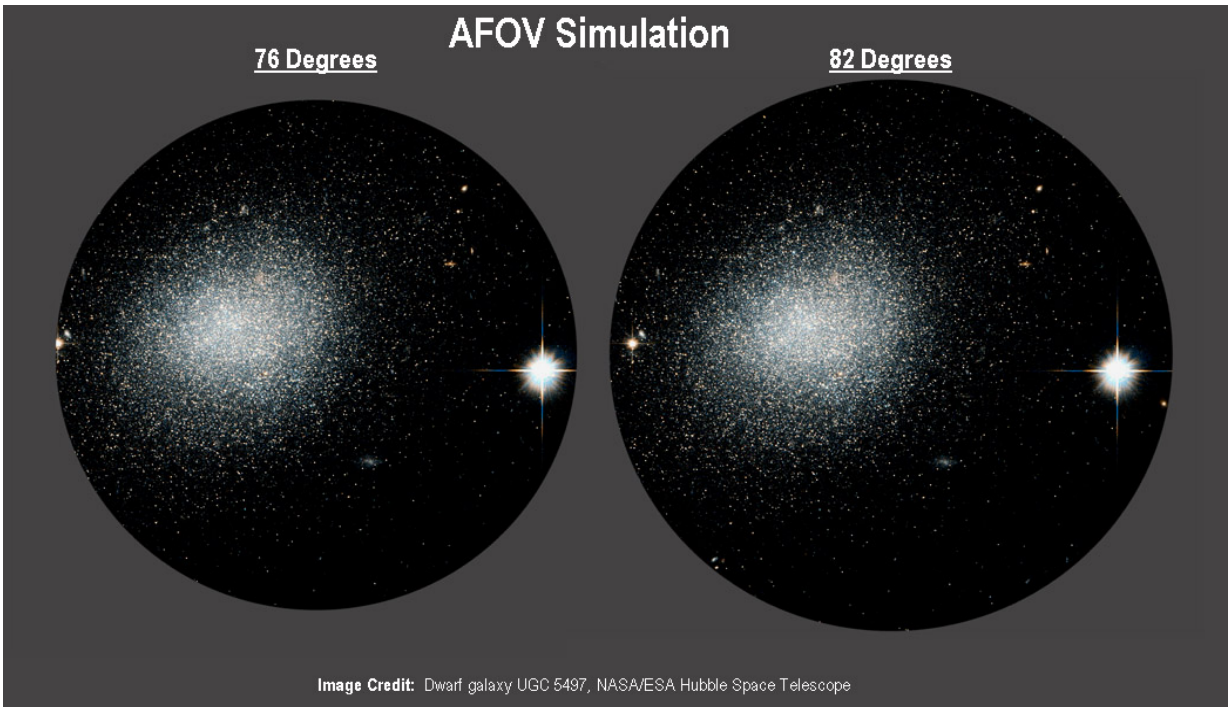

Fig 8: AFOV comparison between a 76º Morpheus and an 82º wide field.

I generally do not like the current 82º class of eyepieces on the market today because I find I always need to dip my eye in very close to see the entire AFOV, and then I need to actually gaze around at the peripheries to see the entire AFOV adequately. With the Morpheus however, I could stand off a comfortable distance from the eyepiece and still see the entire 76º even at a glance! This was extremely pleasant and something no 82º and larger AFOV eyepiece that I have observed through offers today.

During night time observations, the field stop appeared not etched, but still sharp. So the rim of the field stop was just very slightly indistinct and there was no dimming or vignetting visible. During daytime observations, the rim of the field stop showed a small region of blue color. Switching to the Pentax XWs I noticed that they showed this behavior as well, only to a lesser extend. As a result of this small lateral color bleed at the field stop, the field stop did not show as sharply etched as possible. So while not perfectly razor-sharp when viewing star fields, I would still characterize it as distinct with no loss of illumination in the field of view at the field stop.

Finally, the eye positioning for the Morpheus was also quite comfortable, rivaling that of the Pentax XWs. There was never any issues while observing of blackouts or kidney bean or any over-sensitivity to precise eye placement. Finally, I was taken by surprise at how very slim the eyepiece housing appeared when viewing. Unlike most eyepieces, the Pentax XWs included, there was not a large zone of blackness outside the field stop for the majority of the Morpheus focal lengths (the 4.5mm being the exception). Instead, with the Morpheus you see the expansive AFOV and then beyond the field stop there is only a thin rim of blackness that is the housing. The effect is close to that of the infamous disappearing housing that the Edmund 28mm RKE has which makes the field of view appear to float above the eyepiece. This floating characteristic did not happen with the Morpheus, but it was getting close as the AFOV had a little of that detached appearance. So the combination of all these fantastic attributes of an AFOV that was perceptually almost as large as 82º eyepieces, extremely comfortable eye relief and eye positioning, and a housing that appears so thin while observing that the eyepiece gets out of the way during the observation, made the Morpheus a wonderfully engaging experience.

3.c. TRANSMISSION, CONTRAST, COLOR, AND BACKGROUND FOV APPEARANCE

It is often difficult to definitively say that optical “transmission” is a reason for an apparently brighter view during visual assessments. So while I am using the word transmission, what I really mean is how brightly the celestial target appears and how well defined the furthest extents of the object appear. So optical transmission alone may not be responsible for perceived differences in brightness, as contrast and other factors might also come into play when we observe something as being "brighter". With this caveat on “transmission” in mind, testing the Morpheus against corresponding Pentax XW focal lengths, and testing the 9mm Morpheus against the 9mm Takahashi Abbe Ortho, transmission appeared close to on-par across all the eyepieces. Using the TSA-102 and observing relatively dim targets for my location, such as the faint open cluster M11 and the M81/M82 galaxies, all eyepieces gave equal performance. I typically find that nebula or galaxies are where transmission or transmission-contrast differences are more easily seen. Using M81/M82 for this type of a evaluation, the Morpheus showed the pair just as brightly and to the same extent as did the Pentax XWs, and the same even compared to the Takahashi Abbe Ortho. Similarly, viewing the many faintest stars in the M11 cluster using both the TSA-102 and the Lunt 152, I felt all eyepieces showed the faintest stars just as well. This also held true on the faint magnitude 13 star just outside the Ring Nebula and some of Saturn’s more difficult Moons, with both the Morpheus and Pentax XWs showing these challenging targets just as well.

From a contrast standpoint, again I need to caveat that what I am speaking of is the perception of how distinct and "contrasty" various targets appear. Benchmarks I use typically include how easy it is to see subtle variations in Maria on the Moon, how dark and distinct the center of the Ring Nebula appears, and of course how well the most subtle details on planets appear. I typically phrase this as “apparent contrast” or “perceived contrast” since these tests are visually based and not conducted with measuring equipment. Overall, the perceived contrast of celestial targets through the Pentax XWs or the Morpheus was again on-par. Faintest stars were just as visible in M11 or M13 as they shimmered against a black background or in the depths of the core, the Ring Nebula showed a richly dark center contrasted by the rim of the nebula, lunar features showed their most subtle tonal variables in all my favorite test locations like Shroeters Valley and in the lava flows in the Crater Clerke region. Regardless if the instrument used was any of my refractors or the larger Dob or the SCT, in all instances the Morpheus was rendering views on-par with the Pentax XWs in terms of perceived transmission, perceived contrast, and even in tonal qualities and color saturation of various stars like the colorful double Albireo and various carbon stars.

Finally, moving to background field of view uniformity, this is the only areas where some differences appeared. For the 14mm through to 6.5mm Morpheus, the background field of view was nicely uniform and richly dark, typical of what I see through my Pentax XWs. However, the 4.5mm Morpheus was showing a brightening near the field stop. Popularly this is becoming known as edge of field brightening (EOFB). It was easy to see in the 4.5mm Morpheus and appeared in the outer 10-15% of the field of view when using my TSA-102, Lunt 152, and XT10. Through the Meade 8” SCT however, the EOFB appeared to occupy a smaller portion of the outer field of view and was also markedly less noticeable and comparatively seemed to diminish. It should be noted that at no time during my testing were my skies darker than about magnitude 5.5, so if the 4.5mm Morpheus would show this behavior under darker skies I cannot say. What I found myself doing many times to compensate, was to just pull away from the eyepiece a little so the AFOV would truncate this brighter off-axis. In all other respects the field of view in the 4.5mm Morpheus was outstanding, and in particular for planetary observing which will be detailed later in this review. All other Morpheus focal lengths showed rich and uniform AFOVs.

3.d. OFF-AXIS PERFORMANCE (Dob with Paracorr, SCT, and Refractors)

Star points remained sharp to the edge in all telescopes, without exhibiting any impacting field curvature or astigmatism, including in a standard 8" SCT which are more noted for their field curvature, and in the fast f/4.7 Dob with a Tele Vue Paracorr coma corrector in place. The only aberration noted was some degree of lateral color, primarily on brighter stars when using the larger 8" and 10" aperture telescopes when the bright star or limb of the Moon was placed in the outer portion of the AFOV close to the field stop. The smaller aperture of the refractors did not generate much of any noticeable lateral color compared to the larger mirrored instruments. The 14mm and 12.5mm showed the most lateral color, but still at a level I would characterize as well controlled, and starting at a point about 20% from the field stop in the Dob (oddly lateral color in the 8" SCT seemed less than in the 10" Dob). Moving to the Morpheus focal lengths shorter than the 12.5mm, lateral color was even less, and only showing at about 10% from the field stop. Overall good lateral color control for such a wide AFOV.

With the adjustable top Paracorr Type-I set at the #2 position in the XT10 Dob (second line from full down), star points were rendered sharp to the edge in all Morpheus focal lengths. This was an excellent showing given the very fast f/4.7 focal ratio of the XT10. As an example observation, the globular cluster M13 was used and showed spectacularly in all the focal lengths. Regardless of where the globular was placed in the AFOV, even if at the edge and bisected by the field stop, all the stars in the globular cluster remained distinctly visible across the core and to the very edge of the cluster. Nice little pinpoints stars showed everywhere, both in and across the cluster as well as sprinkled throughout the background field of view. M13 was spectacular to observe through the Morpheus providing some very memorable views.

Comparing the off-axis performance of the Morpheus to the Pentax XWs, the Morpheus performed as well in all corresponding focal lengths using the XT10 with Paracorr, the SCT, and the refractors, except for the 14mm focal length where the Morpheus did a better job than the XW. The Pentax 14mm XW has a reputation for field curvature, needing refocus for a sharp star point in the far off-axis. The 14mm Morpheus did not have this issue and therefore gave a more pleasing view than did the 14mm XW.

Turning to the 152mm, 102mm, and 81mm Apochromat refractors, their more forgiving f/8 focal ratios also gave the Morpheus no off-axis issues. And given their smaller apertures, lateral color at the field stop was rarely seen, even for the brighter stars. Doubles such as Albireo and the Double-Double star stayed pinpoint to the field stop and clearly split.

3.e. OFF-AXIS PERFORMANCE (Dob without Paracorr)

As many observers choose to not use a coma correcting device in their fast Dobs, I also experimented with the behavior of the Baader Morpheus compared to the Pentax XWs in this regard. Without a coma corrector, such as the Tele Vue Paracorr, you can expect coma from a fast telescope's mirror to begin impacting star points at about 50% of the way from center in the AFOV, especially for longer focal length eyepieces. But for shorter focal length eyepieces, sometimes you can get away with fairly good performance to the edge if your Dob is not much faster than f/4.5. Without the coma correcting Paracorr in the XT10, all the Morpheus eyepieces behaved the same as far as star points. When brighter stars were moved further into the coma field of the Dob's mirror they were overwhelmed with coma as the primary aberration. Neither noticeable field curvature or astigmatism could be seen or separated from the coma. For these tests of star point behavior without a coma corrector I used bright magnitude zero Arcturus.

Moving from the clinical star point test to some real observations, I started with the Mizar complex of bright stars. Using the Morpheus 14mm I felt that the resulting true field of view (TFOV) was large enough using the longer 14mm eyepiece that the far off-axis of the eyepiece was intruding into a rather severe portion of the XT10's coma field. As a result I did not like the appearance of these bright stars in the off-axis of either the 14mm or 12.5mm Morpheus on this Mizar grouping. However, in the shorter 9mm, 6.5mm, and 4.5mm Morpheus focal lengths I felt observing the bright stars in the Mizar complex was entirely acceptable without a coma corrector. Turning to M39, which has fairly bright components, again I did not like the 14mm but this time I felt that the 12.5mm Morpheus was providing a fairly good view without Paracorr. And of course, without Paracorr all the shorter Morpheus focal lengths were fine as

well on the field of view of bright stars around Mizar. When turning to the fainter stars like in the open cluster M11, I found that even the 14mm Morpheus provided a great view for this celestial object without Paracorr as long as I did not position the cluster it right at the field stop. Overall, without a coma corrector in a fast Dob, I felt the 12.5mm and shorter Morpheus focal lengths demonstrated that they could provide very nice views.

The next question was if the Pentax XWs would handle the coma any better? I observed all the same targets again, this time comparing the Morpheus views without coma correction to those of the corresponding focal length Pentax XWs. Overall I felt the 10mm and shorter XWs were slightly superior in varying degrees if no Paracorr was used. The 10mm XW specifically, I felt did a better job than the 9mm Morpheus showing tighter star points in the coma field. However, the 7mm and 5mm XWs did not show much of a superiority to the 6.5mm and 4.5mm Morpheus and were only a small nuance better in how well they handled star points when no Paracorr was used in the XT10. So overall, the optical design of the Morpheus showed itself to be very close to on-par with that of the highly touted Pentax XW eyepieces when used in fast focal ratio telescopes.

3.f. LUNAR OBSERVATIONS

Lunar observations were primarily conducted using the Lunt f/7.9 152mm Apochromat refractor. All focal lengths of the Morpheus eyepieces showed lunar details nicely etched to the field stop. All eyepieces showed excellent flare control with no light artifacts experienced when the Moon was inside or just outside the field of view. Background space beyond the lunar limb was richly jet-black showing the occasional star in the background. Lateral color of the lunar limb when it was in the far off-axis near the field stop was also well controlled, showing very slight fringing that was at a level consistent with the Pentax XWs. Finally, when the Moon would not fit fully in the field of view and extended beyond the field stop, the field stop showed the same thin line of blue color coming off the field stop that occurred with daytime observations. In daytime use this is sometimes called the blue ring of fire. Both the Morpheus and Pentax XWs showed this artifact, but thinner and less pronounced in the XW. In either case I did not find it distracting in either the Pentax XW or the Baader Morpheus.

To test any perceived contrast difference between the Morpheus and XWs, I observed my familiar test sites for this on the Moon: the twin ejecta tails coming off of Crater Messier A, the many contrast variations in Schroeter's Valley and in particular the eject patterns through Craters Aristarchus and Herodotus, and the darker lava flows between Craters Clerke and Fabbroni. In all these features the Morpheus eyepieces were easily on-par with the Pentax XWs and all the Moon's features were brilliantly displayed as well in both. At the end of the day, when I concluded my critical observing and just observed to enjoy, again I found myself reaching for the Morpheus more than the XWs, especially the 9mm Morpheus as it provided enough of a magnified view through my Lunt 152 Apochromat refractor (133x) and still a large enough TFOV to be able to observe a large portion of the lunar surface. When observing for enjoyment rather than testing, I ended up in the region of Mare Humorum and spending most of my time there -- the many small bright craters and peaks within the much larger 100+km diameter Crater Gassendi appeared like shimmering facet points within the crater. Then, in nearby Crater

Vitello, the bright bull's-eye structure of rims within it were all so dazzlingly lit against the much darker floor of the crater that it was simply a mesmerizing sight to behold!

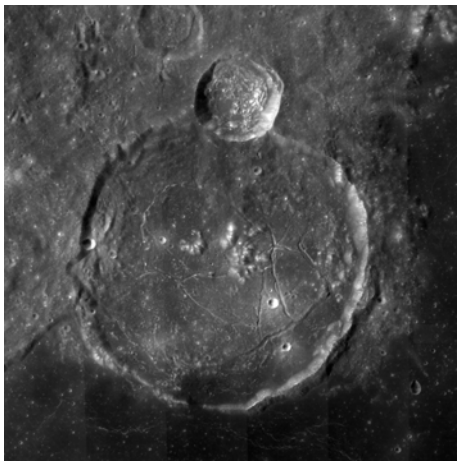

Fig 9: LROC WAC mosaic of crater Gassendi; Credit:NASA/GSFC/Arizona State University.

Overall, I found the most important aspect of the Morpheus was that their generous eye relief, their expansive AFOV, and how the entire field of view was visually surrounded by only a very thin housing allowing the eyepiece to get completely out of the way, let me concentrate on the lunar observations unencumbered in any way by the eyepiece. It proverbially "got out of the way" during observations allowing me to more fully concentrate on the targets. I also found the Morpheus slightly more comfortable to use compared to the Pentax XW, as I was not doing the slight refocuses for optimum sharpness that I generally do with the XWs on the Moon as I move my focus to different portions of the field of view. Overall the Morpheus provided an excellent and satisfying lunar wide field experience.

3.g. PLANETARY OBSERVATIONS

Planetary observations were conducted on Saturn using the Orion f/4.7 XT10 Dob with Paracorr and in the Lunt 152mm f/7.9 Apochromat refractor. The 9mm Morpheus was compared to the 9mm Takahashi Abbe Ortho (both 133x), the 14mm Morpheus vs. the 14mm XW were Barlowed with a Tele Vue 2.1x (both ~180x), the Takahashi 6mm Abbe vs, the Morpheus 6.5mm vs. the Pentax 7mm XW (200x vs 185x vs. 172x respectively), and finally the Morpheus 4.5mm vs. the Pentax 5mm XW (267x vs. 240x respectively).

Both eyepieces showed a wealth of details on Saturn, including the A, B, and C rings, the Cassini Division, the Enke Minima, and the Equatorial Zone, Equatorial Belt, Temperate Zone, Polar Region, and the Hexagon. Saturn's moons Titan, Rhea, and Dione were also all nicely visible during all observations. The differences between the Morpheus and the Pentax XWs and Takahashi Abbes were revealed as being subtle, but consistent over may evenings of testing. While I expected the differences to primarily show in the subtleties of the clouds within the Equatorial Belt and Temperate Zone, which is where atmospheric structure within these are sometimes very illusive on Saturn, I was also able to detect differences in the Cassini Division and the Enke Minima as well.

Between the 6.5mm Morpheus and the 6mm Takahashi Abbe, he Morpheus showed the dip in brightness of the Enke Minima more distinctly than Takahashi, but oddly the Cassini Division was more easily trace around the front of the planet in the Takahashi Abbe than through the Morpheus -- I would have expected both features to be bested by one of the eyepieces rather than this switch in behavior between the two. I went back and forth between these two eyepiece many times on multiple evenings, but the results did not waiver. Whatever the reason, I cannot rule out that it was nothing more than the slight difference in focal length between the eyepieces that might have been the primary driver since the two were not perfectly matched at 6mm vs. 6.5mm.

Comparing the Barlowed 14mm Pentax XW vs. the Barlowed 14mm Morpheus, I was a little surprised to see that the Morpheus was slightly edging the XW. Basically details within the Equatorial Belt and the Temperate Zone were more distinctively detailed through the Morpheus whereas through the XW the structures within each of these areas more dissolved into each other instead of being distinctly delineated. Finally, the Morpheus was also showing the darker and richer color of the Polar Hexagon more distinctly than was the XW. I also repeated the above observations using the 6.5mm Morpheus vs. the 7mm XW, but the outcomes did not deviate from what was observed between the Barlowed 14mms. Overall, considering all the observations from the many evenings observing Saturn, it was clear that the Morpheus and XWs were very close to each other, and that the Takahashi Abbes were doing just slightly better related to perceived contrast, especially in the stark black of the Cassini Division where it is thinnest and most difficult to see at the very front of the planet. All things considered though, all three eyepiece brands were providing highly competitive views and proved excellent for providing both sharp and comfortable planetary observing.

3.h. DSO OBSERVATIONS

All the DSO observations were evaluated in relation to the performance of the Pentax XWs. The Orion f/4.7 XT10 with Paracorr, the Lunt 152mm f/7.9 and Takahashi TSA-102 f/8 Apochromat refractors were the primary instruments used for these observations.

In general, all DSO were rendered with equal precision and aesthetics between the Pentax XWs and the Baader Morpheus -- faintest stars were just as well portrayed in each, nebula an galaxies showed as brightly and to the same extent in their outer reaches, and fields of view were just as richly dark (with the already noted exception of the 4.5mm Morpheus which has a degree of brightening near the field stop). The only notable distinguishing factor between the eyepieces was the larger and more engaging apparent field of view of the Morpheus.

The globular cluster M13 was rendered beautifully through the Morpheus. The larger 76º AFOV was a nice plus over the XW giving M13 even more context with the extended TFOV filled with many faint pinpoint stars in the background furthest from the globular cluster. The background AFOV was rich and dark in both eyepieces, and star points were perfectly rendered even at the field stop, as I could place M13 so it was cut in half by the field stop and every star in the globular cluster remained visible, pinpoint, and beautifully shimmering.

Turning to M57, the Ring Nebula, it revealed its oval shape very obviously, its central region contrasted richly dark, and the small 13th magnitude star just outside the nebula was easily seen. But what I liked most about M57 was not the nebula but was all the delicate fainter stars that were sprinkled across the background field of view. They added so much context to the view that the wider AFOV of the Morpheus really did step up the view a notch over the XWs. And when comparing the 4.5mm Morpheus view to that of the 82º Meade 5000 4.7mm UWA, it was absolutely no contest in terms of both comfort and enjoyment. Like all the 82º varietals available, to see the entire AFOV you need to get quite close to the eyepiece as their eye lenses are many times strongly concave, and often you need to peer around to effectively observe the outer most regions of the AFOV. With the 4.5mm Morpheus however, the view was virtually

just as expansive as the 4.7mm Meade 5000 UWA and it was all available in an instant and at a comfortable glance!

Next, the Cygnus region was probably the most enjoyable of all the observations with its rich field of stars, many interesting asterisms, open clusters, and the beautiful showcase colorful double star Albireo. Again, the long comfortable eye relief and the expansive 76º AFOV of the Morpheus made Cygnus an experience for the entire evening on many of the evaluation outings. When I view this region, I typically save Albireo to last as I like its beautiful contrasting gold and blue components to be the final memory for the evening. And like the Pentax XWs, the Morpheus did not disappoint and showed the colors of this double vividly and highly saturated. Truly one of the most impressive doubles in the northern skies.

Finally, turning to the M81/M82 pair of galaxies, the Morpheus held their own against both the Pentax XWs and the Takahashi Abbe Orthos. Each galaxy displayed nicely against a dark background, revealing their shapes, brighter cores, and in the case of M82 some of the structure of bright and dark areas near its central area were nicely evident.

3.i. BINOVIEWER OBSERVATIONS

Fig 10: 14mm Morpheus eyepieces with included optional winged eyeguards in a William Optics binoviewer.

For binoviewing, the 14mm Morpheus were definitely my favorite focal lengths to use as I enjoyed the larger swatch of true field of view the longer focal lengths afforded. I prefer winged eye guards for binoviewing, so I switched to these eyeguards when binoviewing with the Morpheus. I conducted the binoviewing assessment primarily in my TSA-102 and Lunt 152 Apochromat refractors as both of these telescopes are bino-friendly and do not require the Optical Corrector Accessory (OCA) or a Barlow to have the binos come to focus, so they can operate at the native 14mm focal lengths of the Morpheus.

Again, the most impressive impression the Morpheus provided when binoviewing was their ability to stand off away from the eyepiece when observing. The resulting merged binocular view was also massively wide, making me feel more like I was observing with conventional binoculars the view seemed that wide. Also, the way the housing around the field of view was just a thin black area made the bino field of view seem more like a picture delicately framed in front of my eyes, creating an incredibly engaging experience. And while physically the Morpheus are a little long, their light weight was very much appreciated as they caused no undue balancing issues when binoviewing in my refractors or on my Orion XT10 Dob. Overall I found them very satisfying and exceedingly engaging for binoviewing, and as a result I am eagerly looking forward to trying the 17.5mm Morpheus in the binoviewers!

4. CONCLUSIONS

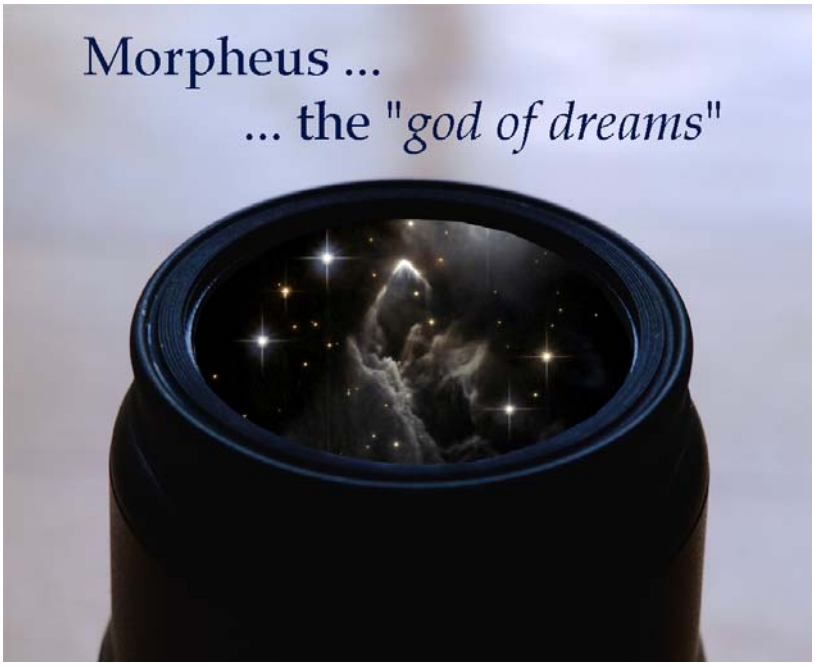

Fig 11: Image inset: Nebula IRAS 05437+2502, NASA Hubble Space Telescope

Morpheus, in Greek mythology known as the god of dreams, and now the new Baader Planetarium entry in the field of high-performance wide fields. In field tests, Morpheus eyepieces proved themselves to be a very sizable step up in both performance and ergonomics compared to the older Hyperion line. Its expansive 76º AFOV, friendly long eye relief, comfortable no-hassle eye positioning behavior, and most importantly its uncompromising excellent performance even in a fast f/4.7 Dobsonian, provided uncompromising views in a fast

Dobsonian, Apochromat refractor, and SCT telescopes. Overall their performance was indicative of other top tier wide fields like the Pentax XWs, and their AFOV was perceived as being more indicative of the 82º AFOV class of eyepieces, only with much superior comfort and usability. Clearly they deliver premium-level performance and all at an attractive price point compared to the competition.

~ ~ ~

About the Author

William "Bill" Paolini has been actively involved in optics and amateur astronomy for 45 years, is author of the desk reference on astronomical eyepieces: *Choosing and Using Astronomical Eyepieces* which is part of the Patrick Moore Practical Astronomy Series published by Springer of New York, has published numerous product reviews on major online amateur astronomy boards, and volunteers with public tours at a famous vintage Clark refractor site.

Bill's professional background is as an officer in the U.S. Air Force and as a computer scientist, holding a Bachelor's degree in Computer Science and a Master of Science in Education. He has worked for the U.S. Department of Defense, the U.S. Department of Commerce, the Federal Trade Commission, the Federal Reserve, the World Bank, and a variety of commercial corporations in the information technology, information technology security, and telecommunications industries.

Bill has been observing as an amateur astronomer since the mid-1960's, grinding mirrors for homemade Newtonian telescopes during the 1970's and eventually owning, using, and testing several hundreds of eyepieces in a wide variety of telescopes from Achromatic and Apochromat refractors to Newtonian, Maksutov-Cassegrain, and Schmidt-Cassegrain designs. Today he enjoys observing and testing new equipment from his suburban home west of Washington, D.C., where his primary amateur astronomy pursuits are lunar, planetary, bright nebula, open cluster, and globular cluster observing.

***