

The Challenge of Messier 102

Background

“Anyone who has never made a mistake has never tried anything new.” - Albert Einstein

Comet hunter Charles Messier established a list of deep sky objects that he worried might be confused with comets in the 18th century - the famous Messier Catalog. Messier 102 (M102) is a galaxy listed in the Messier Catalogue that cannot be unambiguously identified. Its original discoverer Pierre Méchain retracted his discovery of M102 two years after publication and said that it was a duplicate observation of Messier 101, a large and beautiful face on spiral galaxy located near the eastern end of the Big Dipper. This image of M101 is by Scott Bratt, using his Seestar 50S:



Later historical evidence favors M102 as the galaxy NGC* 5866 (a match which NASA accepts), although other galaxies have been suggested as possible . These are based on assumptions about the positional error made at discovery or transfer of data across time and observers. None of the M102 candidates (besides M101) is close in size or brightness to M101, so only exact duplication would occur as an error in appearance.

*Refers to the New General Catalog, an exhaustive list of deep sky objects

Astronomical League Observing Challenge

Author's note: This is Challenge #16, located at <https://www.astroleague.org/al-observing-challenge-special-observing-award/>

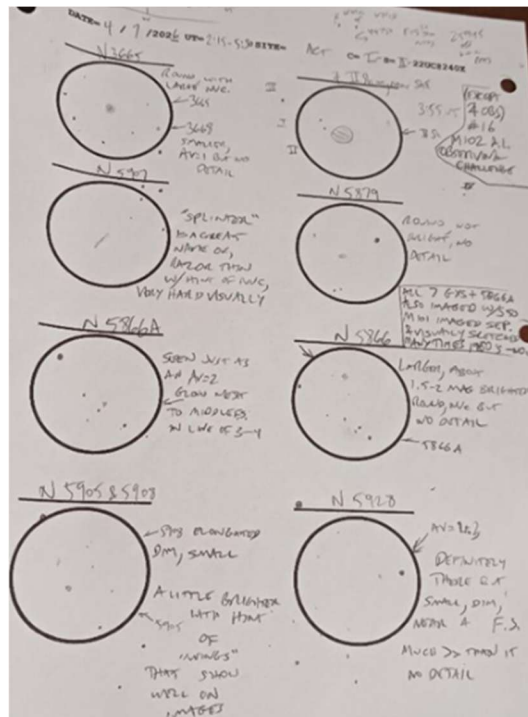
The purpose of challenge #16 is to observe all the candidates and choose which galaxy near M101 you think presents the best case for being M102. There are several rules about when you can observe (June only), and what activities must be completed and submitted by July 31, 2026. You receive a certificate if completed, but even if you just look at them casually, they represent part of an interesting historical puzzle. Much like Messier 40, a faint double star in the same constellation

of Ursa Major, M73 (four faint stars), and the many strange NERFMS[®] (never existed, real faint, or multiple stars) that fudge up the NGC catalog, these indicate the problems of human analog records. Of course, there are lots of digital records made by non-humans that are also problematic, such as the current top 40 songs on Spotify.

The Astronomical League Observing challenges webpage (listed above) includes a link to a short paper discussing the evidence for each galaxy. The eight on the list are shown in order with the images below. The case for M101 is simple duplication. Others have geometry with field stars etc. that may make sense for an error in recording position. And there are those that are similar in appearance to others nearby, another source of misidentification. Many other galaxies not on the list lie close to M101, and within M101 there are knots of nebulosity (stellar nurseries, globular clusters, etc.) that could be even more possible answers, but since the original entry was clearly not within M101 or very close to it, those objects (many of them in the NGC catalog) can be dismissed.

Observation and Imaging

The challenge may be completed with either visual observations and logs / sketches, or with imaging. I decided to try both. The images and sketches below are by the author, and the images replicate the order listed above M101, NGC 5866, NGC 5879, NGC 5905, NGC 5907, NGC 5908, NGC 3665, and NGC 5928. The sketches were made using my 22" Obsession UC, with 10mm Ethos eyepiece, giving 240x. The images used my Seestar 50S, with various numbers of 10s subs.







Historical View

“In general, life is better than it has ever been, and if you think that, in the past, there was some golden age of pleasure and plenty to which you would, if you were able, transport yourself, let me say one single word: Dentistry.” - All the Trouble in the World: The Lighter Side of Overpopulation, Famine, Ecological Disaster, Ethnic Hatred, Plague, and Poverty, P.J. O’Rourke, p.2, 2007.

<https://www.astroleague.org/wp-content/uploads/2026/03/M102-Messiers-Unknown-Journey.pdf> - found linked on the AL webpage - gives quite a lot of historical info, has listed sources, and is a good template for your own take on the individual galaxies. Additional sources are listed below, of a more observational scope, to help you find the targets.

As with most debates about centuries-old records, there are no definite answers here. However, at least to me, after looking at the appearance of each, where they “ride” in the sky relative to the stars in the original entry by Méchain, and my experience with sketching and cataloging more than ten thousand deep sky objects, the answer is simple.

My Choice

“We are our choices.” - Jean-Paul Sartre

To me, M102 is M101. When I began astronomy as a teenager, this was the only answer I saw in the books and catalogs I read. I see this as a simple mistake, somewhere between Méchain publishing its discovery, Messier’s copying to his own notes, Méchain’s retraction, and Pierre’s unambiguous assertion that it was simply a duplication of his observation of M101.

The idea that later historical evidence favors M102 as the galaxy NGC 5866 is enough for second place in my mind, mainly because it is the explanation accepted by NASA. One basis for this selection is the appearance of NGC 5866 as bright, but nothing like the famous “Pinwheel Galaxy” M101. True, but visual descriptions of nebulous objects are famously subjective and prone to error and sky conditions. The use of certain field stars to triangulate the position is accepted in this case while errors with field stars are noted as reasons to doubt M102’s ID by historical reviewers.

The other galaxies, I think, can be dismissed out of hand, as they don’t have the appearance to favor duplication or anything regarding their appearance or field star geometry to prop them up as

winners, at least no better than NGC 5866. The fun part here is that we really won't ever know for sure, unless more documents are found.

June is the Month

"How dreary to be some-body, how public, like a frog!
To tell one's name, the live-long June, to an admiring bog" – *I'm Nobody! Who are you?* - Emily Dickinson

So, if you would like to take this observing challenge, look up the links and read the rules carefully. Otherwise, you can make up your own rules and do it your way; it's all up to you. But, for the program June is the month to do the observations. And, even if you are looking casually, the best months for these northern objects are March – August. If you do try to see these, with or without submitting for a certificate, let me know what you think. My email address is hafsnt1@gmail.com

Author's note – my sketches and images were from before the allowable period to get this article out; however, I do not expect any of the objects will have changed very much...

Sources:

Burnham's Celestial Handbook, vol. 3, p. 2021-2022, Robert Burnham, Jr., 1978.

The Messier Album, p. 182, J. H. Mallas and Evered Kreimer, 1978.

Webb Society Deep-Sky Observer's Handbook, vol. 4, "Galaxies", p.143, Kenneth Glyn Jones, ed. 1981.

"M102: Mystery Solved", Sky and Telescope, volume 109, number 3, page 78, , Stephen James O'Meara, March 2005

"Messier 102. An article on the controversy", messier.seds.org. Hartmut Frommert, (web: October 2018) [print: May 1995].

"Messier 102 (The Spindle Galaxy)", science.nasa.gov, Rob Garner, (22 October 2019).