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A general catalogue of molecular hydrogen emission-line objects (MHOs) in outflows from young stars⋆,⋆⋆

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ABSTRACT

We present a catalogue of Molecular Hydrogen emission-line Objects (MHOs) in outflows from young stars, most of which are deeply embedded. All objects are identified in the near-infrared lines of molecular hydrogen, all reside in the Milky Way, and all are associated with jets or molecular outflows. Objects in both low and high-mass star forming regions are included. This catalogue complements the existing database of Herbig-Haro objects; indeed, for completeness, HH objects that are detected in H_2 emission are included in the MHO catalogue.

Key words. catalogs – stars: formation – Herbig-Haro objects – infrared: ISM – ISM: jets and outflows

1. Introduction

For over 30 years, astronomers have been observing Herbig-Haro (HH) objects, jets and outflows in star forming regions in the near-infrared. The molecular hydrogen $v = 1$–0 S(1) line at 2.122 μm is a particularly powerful tracer of shock-excited features in molecular outflows (e.g. Wilking et al. 1990; Garden et al. 1990; Zealey et al. 1992; Gredel 1994; Davis & Eislöffel 1995; Zinnecker, et al. 1998; Reipurth et al. 1999; Eislöffel 2000; Stanke et al. 2002; Caratti o Garatti et al. 2006; Walawender et al. 2009; Davis et al. 2009). Although excited in a similar way to HH objects, these molecular hydrogen emission-line features are often too deeply embedded to be seen at optical wavelengths. They are thus not classified as HH objects, which are strictly defined by optical criteria, and are instead labelled in a rather hap-hazard way, often with the authors' initials. In large on-line databases this can lead to some ambiguity.

Our goal with this catalogue was therefore to develop a self-consistent list of H_2 emission-line objects, in a manner similar to that used so successfully for HH objects. With guidance from the International Astronomical Union (IAU) Working Group on Designations, we have adopted a scheme that simply lists objects sequentially, although objects are grouped by region (see below). The simple acronym "MHO", for molecular hydrogen emission-line object, is used to refer to these objects. This acronym has been approved by the IAU registry, and has been entered into the on-line Reference Dictionary of Nomenclature of Celestial Objects[1].

⋆ http://www.jach.hawaii.edu/UKIRT/MHCat/

⋆⋆ Tables A.1 to A.15 are also available in electronic form at the CDS via anonymous ftp to cdsarc.u-strasbg.fr (130.79.128.5) or via http://cdsweb.u-strasbg.fr/cgi-bin/qcat?J/A+A/511/A24

[1] http://cdsweb.u-strasbg.fr/cgi-bin/Dic?MHO

2. What constitutes an MHO

Only objects associated with outflows from young stellar objects (YSOs) and protostars are included in this catalogue. We do not list outflows from evolved stars (AGB stars or proto-planetary nebulae) or extra-galactic sources. Also, objects should be spatially resolved; unresolved emission-line regions associated with an accretion disk or the base of an outflow (that were observed spectroscopically) are not listed.

Since large-scale imaging surveys are now revealing tens or even hundreds of objects in some regions (e.g. Stanke et al. 2002; Khanzadyan et al. 2004b; Walawender et al. 2009; Davis et al. 2009), spectroscopic confirmation of every feature is not usually practical (although multi-object spectrographs that operate in the infrared will certainly help in this regard). Therefore, to properly identify an MHO, narrow-band molecular hydrogen images should be accompanied by either adjacent narrow-band continuum images or (flux-scaled) broad-band K images. It is obviously important that these shock-excited features be distinguished from wisps and knots of continuum emission. Morphology alone should not be used to identify MHOs, although the shape of an object may help distinguish features in outflows from fluorescently excited emission regions, especially in high-mass star-forming regions. If available, MHOs should have a near-infrared spectrum consistent with thermal (shock) excitation, rather than non-thermal (fluorescent) excitation (e.g. Gredel 1994; Lorenzetti et al. 2002; Caratti o Garatti et al. 2006; Gianninni et al. 2008). Kinematic studies – either proper motion studies (Hodapp 1999; Davis et al. 2009) or high spectral-resolution line studies (Carr 1993; Schwartz & Greene 2003; Davis et al. 2004; Li et al. 2008) – are also useful for distinguishing MHOs from what are essentially stationary emission-line features in photon-dominated regions (PDRs). The association of an MHO with a bipolar molecular outflow, traced

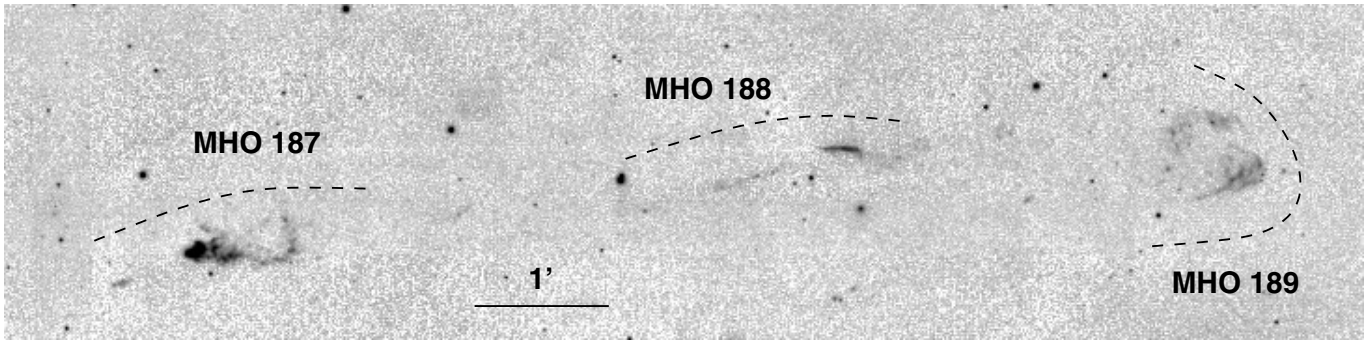

Fig. 1. H_2 (+ continuum) image of the MHO 187-189 outflow in Orion A. Data from Davis et al. (2009).

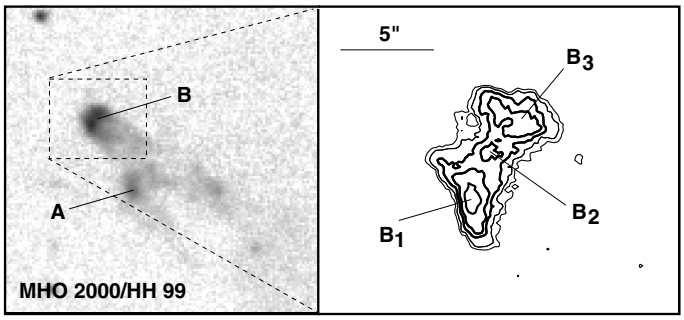

Fig. 2. A simple example of how knots and sub-knots within a single MHO should be labelled, using letters and, for the sub-knots, numbers.

in (sub)millimeter molecular lines such as CO, likewise confirms the dynamical nature and shock-excitation of the object, and its association with a protostar (e.g. Yu et al. 1999, 2000; Shepherd et al. 2003; Beuther et al. 2003; Reipurth et al. 2004).

The MHOs listed in this catalogue have all been identified in the near-infrared (1–2.5 μm) lines of molecular hydrogen. Objects detected only in other near-IR lines (e.g. [FeII]) are not included. We also exclude objects observed only in the UV or mid-infrared (e.g. with the *Spitzer Space Telescope*). If an object is subsequently detected in molecular hydrogen line emission in the near-IR, it will be included in the MHO catalogue.

Examples of MHOs are shown in Figs. 1–3. In most cases we have labelled "groups of knots" rather than individual features or whole outflows. Assigning an MHO number to every resolved feature would of course lead to a vast catalogue that was impossible to maintain. On the other hand, associating widely-spaced knots with a single outflow is often difficult, given the variability of these line emission features and the large sizes of some outflows. MHO 187–189 (shown in Fig. 1) is a good example, where three complex groups of features that may well form part of the same outflow are none-the-less catalogued separately, although individual knots within each region are not. As with HH objects, if necessary, individual knots should be identified with letters; sub-knots should then be labelled with letters and numbers. HH 99 (MHO 2000) is shown as an example in Fig. 2 (see also the labelling of the knots and sub-features in the detailed, proper-motion study of HH 47/46 in Eislöffel & Mundt 1994).

In some regions multiple knots and bow shocks radiate in many directions from a tight cluster of young stars. Since the relationship between these objects is often unclear – each bow shock may for example be driven by a different outflow that is powered by a different protostar in the central region – we also label these features separately. An example of such a region, the spectacular AFGL 961 massive star forming cluster in the Rosette nebula (described in detail by Aspin 1998; Li et al. 2008), is shown in Fig. 3.

Finally, for completeness we have also given a catalogue number to many well-known HH objects (e.g. HH 1/2 = MHO 120/125, HH 212 = MHO 499), though only if these are detected in the near-IR lines of molecular hydrogen. Whenever possible, we group features together in a manner consistent with the HH object catalogue.

3. The MHO Catalogue

3.1. Grouping MHOs by region

There are already almost 1000 objects in the MHO catalogue. In an attempt to bring some semblance of order to the list, we have grouped objects by "region".

Strictly speaking, there are no official names for, or boundaries to, the star-forming giant molecular clouds in our Galaxy. We have therefore attempted to define large regions based on the well-defined boundaries of the 88 constellations (as outlined by the IAU[2]). MHOs are almost exclusively confined to molecular clouds in and around the Gould belt and the Galactic plane (the vast majority of molecular outflows are driven by embedded protostars (Davis et al. 2008, 2009); relatively few T Tauri stars drive jets that have been detected in molecular hydrogen line emission, and of course H_2 emission, by its very nature, requires the presence of dense molecular gas). We have therefore, in some areas, modified these boundaries slightly to include large groups of clouds. We use the large-scale CO J = 1–0 survey of the Milky Way, obtained with 1.2 m telescopes in Cambridge, Massachusetts and Cerro Tololo, Chile (Dame et al. 2001) to identify these clouds. Even so, the boundaries will still pass through some smaller, less massive clouds and so the boundaries should only be considered accurate to within a few arcminutes.

The regions defined in this way are listed in the first column in Table 1. Note that, in the heavily-populated area of Orion, we have split the region up into two sub-regions, Orion A and Orion B, as is the popular convention.

The boundaries of each region are also marked on low-resolution CO J = 1–0 maps in Fig. 4. M 1–M 9 in these figures and in Table 1 refer to maps 1 to 9. Note that not all 88 constellations are listed in Table 1, since those at high galactic latitudes do not contain star forming regions and/or known outflows with MHOs. Indeed, five regions; Camelopardalis, Centaurus,

[2] http://www.iau.org/public_press/themes/constellations/

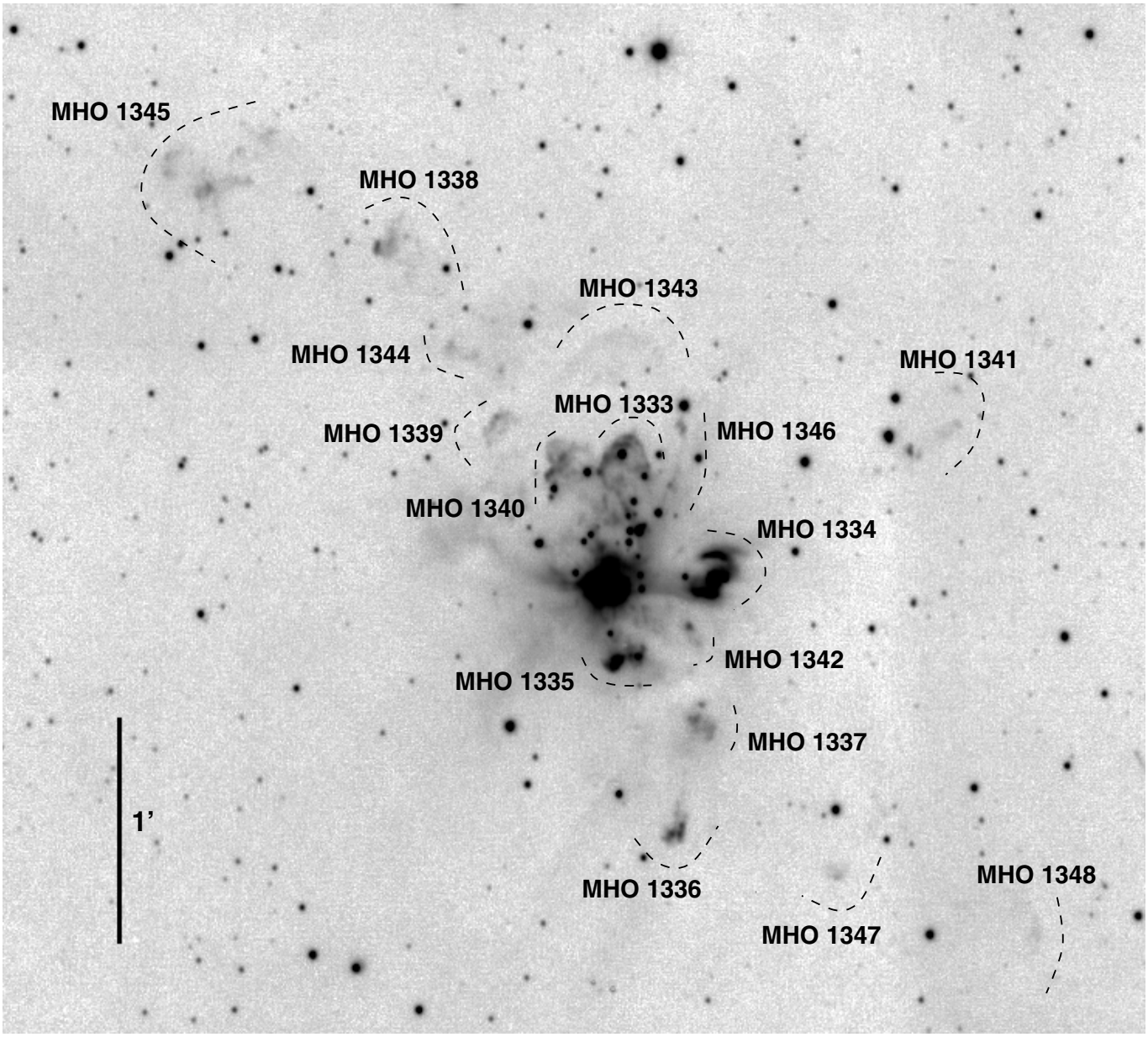

Fig. 3. H_2 (+ continuum) image of AFGL 961 in the Rosette nebula star forming region in Monoceros. Catalogued MHOs are labelled; unpublished data obtained with WFCAM at UKIRT (see Davis et al. 2009 for details of this instrument, the WFCAM data archive and data processing techniques used to create this image).

Circinus/Lupus, Lyra and Andromeda, as yet contain no MHOs. We include these regions in the catalogue to facilitate the addition of future discoveries.

The MHO number range listed in the final column in Table 1 defines the range of MHO numbers currently being used in each region. To date, not all numbers have been assigned to an MHO (in any of the regions).

The latest version, at the time of writing, of the MHO catalogue is published here in Appendix A.

3.2. The on-line database of MHOs

The entire catalogue is also available on-line at `http://www.jach.hawaii.edu/UKIRT/MHCat`.

This MHO homepage includes the table of regions shown here in Table 1; in the on-line catalogue, links in the first column point to separate tables of MHOs for each region. These tables list the MHO number, right ascension and declination, citations to the discovery paper and subsequent near-IR imaging papers, together with identifications used in the literature, any associated HH objects, and a brief description of each object. A small image of the MHO is also presented with the object clearly marked; example images from the on-line catalogue are shown here in Fig. 5.

In the on-line catalogue simple ascii tables are also available. These list only MHO number, right ascension and declination, associated HH object, and region. These very basic tables may be downloaded and used to plot positions of MHOs on images or maps taken at other wavelengths, or to label H_2 emission-line

Table 1. Regions used to group MHOs.

Region[a]	Map[a]	Approx. RA Range[b]	Approx. Dec Range[b]	MHO Numbers[c]
Perseus	M 2	03h00m→ 04h00m	+25°→ +35°	500–699
Auriga	M 2	03h30m→ 06h30m	+30°→ +56°	1000–1099
Taurus	M 2	03h00m→ 05h50m	+10°→ +30°	700–799
Camelopardalis	M 1	04h00m→ 08h00m	+56°→ +90°	1100–1199
Orion A	M 3	04h45m→ 06h00m	–15°→ –04°	1–299
Orion B	M 3	04h45m→ 06h00m	–04°→ +16°	300–499
Gemini	M 3	05h50m→ 08h00m	+14°→ +34°	1200–1299
Monoceros	M 3	06h00m→ 08h30m	–13°→ +14°	1300–1399
Puppis	M 4	06h30m→ 09h00m	–38°→ –13°	1400–1499
Vela	M 4	07h30m→ 11h00m	–55°→ –38°	1500–1599
Carina	M 5	08h00m→ 12h00m	–75°→ –55°	1600–1699
Chameleon	M 5	08h00m→ 14h00m	–85°→ –70°	3000–3099
Centaurus	M 5	12h00m→ 15h00m	–70°→ –30°	1700–1799
Circinus/Lupus	M 6	15h00m→ 16h00m	–70°→ –30°	1800–1899
Scorpius	M 6	16h00m→ 18h00m	–60°→ –30°	1900–1999
Corona Australis	M 6	18h00m→ 19h30m	–45°→ –35°	2000–2099
Ophiuchus	M 6	16h00m→ 18h00m	–30°→ +05°	2100–2199
Serpens	M 7	17h30m→ 18h40m	–15°→ +05°	2200–2299
Sagittarius	M 7	18h00m→ 20h30m	–35°→ –12°	2300–2399
Aquila	M 7	18h40m→ 20h30m	–12°→ +15°	2400-2499
Lyra	M 8	18h20m→ 19h00m	+05°→ +45°	2500–2599
Vulpecula	M 8	19h00m→ 21h30m	+15°→ +30°	2600–2699
Cygnus	M 9	19h00m→ 22h00m	+30°→ +55°	800–999
Cepheus	M 9	19h00m→ 23h30m	+55°→ +90°	2700–2799
Andromeda	M 9	22h00m→ 00h00m	+30°→ +55°	2800–2899
Cassiopeia	M 1	23h00m→ 04h00m	+50°→ +90°	2900–2999

Notes. [(a)] The name of each region, and the map used to define each region; [(b)] approximate RA and Dec range associated with each region (a more precise range is drawn on each map in Figs. 4; [(c)] the range of MHO numbers used for objects within each region (note that objects have not yet been assigned to all numbers in each range).

features in new near-IR images of star forming regions already covered by the catalogue.

3.3. Searching through the catalogue

An easy way to navigate through the catalogue and, in particular, to search for objects by right ascension and declination, was thought to be desirable. A *Perl* script has therefore been developed which allows the user to enter coordinates and a search radius; the script returns an HTML table containing MHOs found within the search area. As with the full region tables, coordinates, references to published observations, a small image and a brief description of each object is returned. This tool is particularly useful for finding MHOs in a star forming cloud or cluster being studied at different wavelengths, or for establishing whether an object is a new discovery, or has in fact already been observed.

3.4. Checking the catalogue

Duplicating existing entries and errors associated with the coordinates assigned to each MHO were our two main concerns when compiling the catalogue. To combat both problems, the ascii text files created for each region were imported into the *STARLINK GAIA* graphical display tool (Draper et al. 2008) and plotted over wide field *R*-band Digitised Sky Survey (DSS) images or, if available, astrometrically-calibrated infrared images. The infrared images were all obtained from the UKIRT WFCAM archive[3].

3.5. The future

Our aim is to keep the MHO catalogue as up-to-date as possible. Also, obviously we want to avoid duplication of catalogue numbers (people using the same numbers for different objects). Therefore, we ask that those with new observations please check the catalogue for previous observations, and contact the catalogue organisers (currently Chris Davis: `c.davis@jach.hawaii.edu`) before papers are written, and certainly before figures and tables of MHOs are finalised, so that new numbers can be assigned.

[3] http://surveys.roe.ac.uk/wsa/index.html

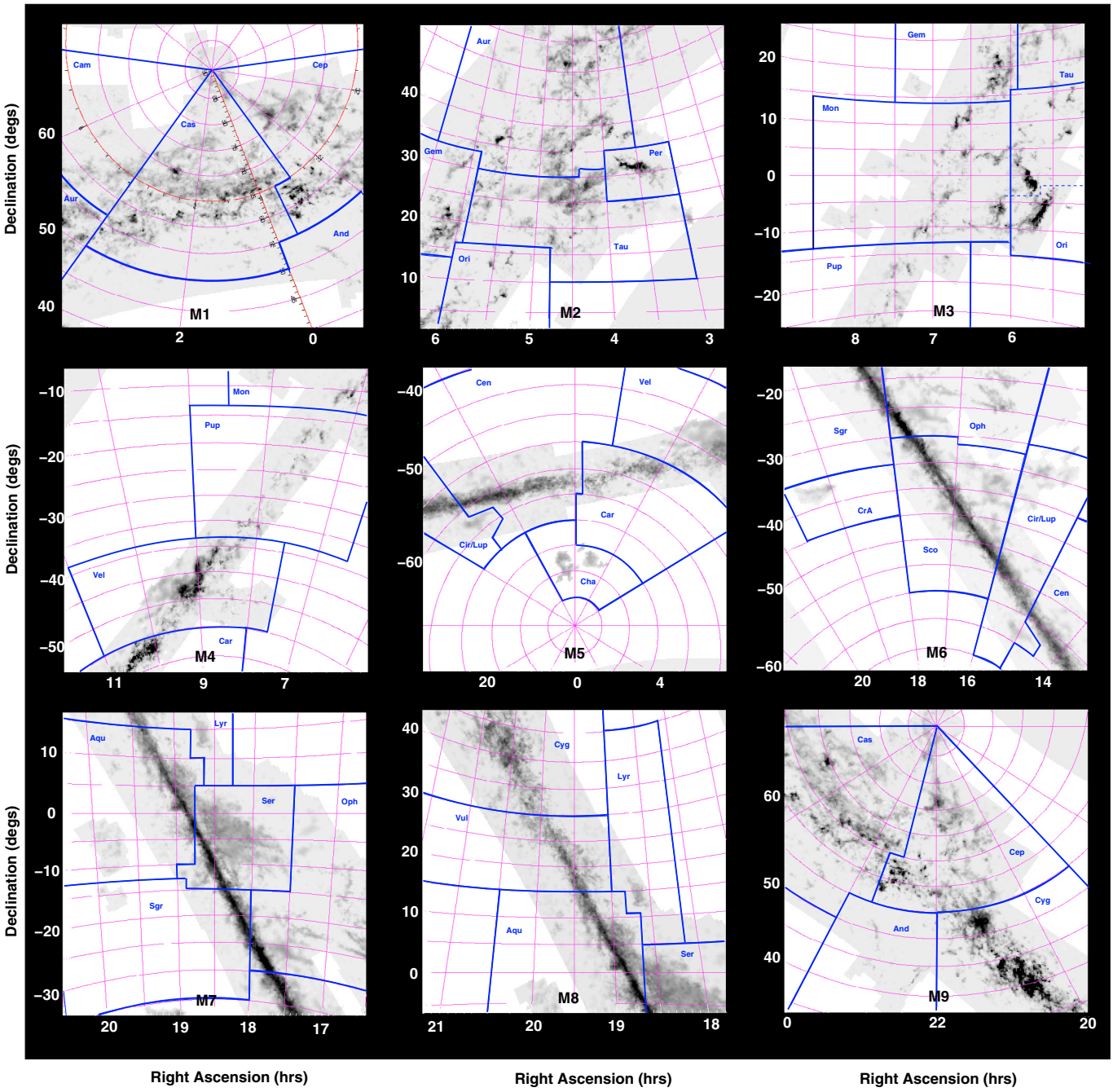

Fig. 4. Large-scale maps in CO J = 1–0 emission with the boundaries of the regions used to group MHOs marked with thick lines.

4. Summary

A catalogue of molecular hydrogen emission-line objects (MHOs) has been compiled from the literature. The catalogue includes objects imaged in molecular hydrogen line emission (almost entirely in the 1–0 S(1) line at 2.122 μm). It does not include objects observed *only* at UV or mid-IR wavelengths.

The catalogue lists only shock-excited features associated with outflows from young stars. Objects in both low and high-mass star forming regions are included. Similar objects associated with proto-planetary nebulae or extra-galactic sources are not included.

The catalogue currently contains almost 1000 objects. Some are well-known Herbig-Haro objects which we have included for completeness. The catalogue is available on-line at http://www.jach.hawaii.edu/UKIRT/MHCat/ . With the help of the star formation community, we aim to maintain this catalogue for many years to come, adding new objects as they are discovered. We also hope that in the future, the MHO acronym will be used universally when labelling these enigmatic objects.

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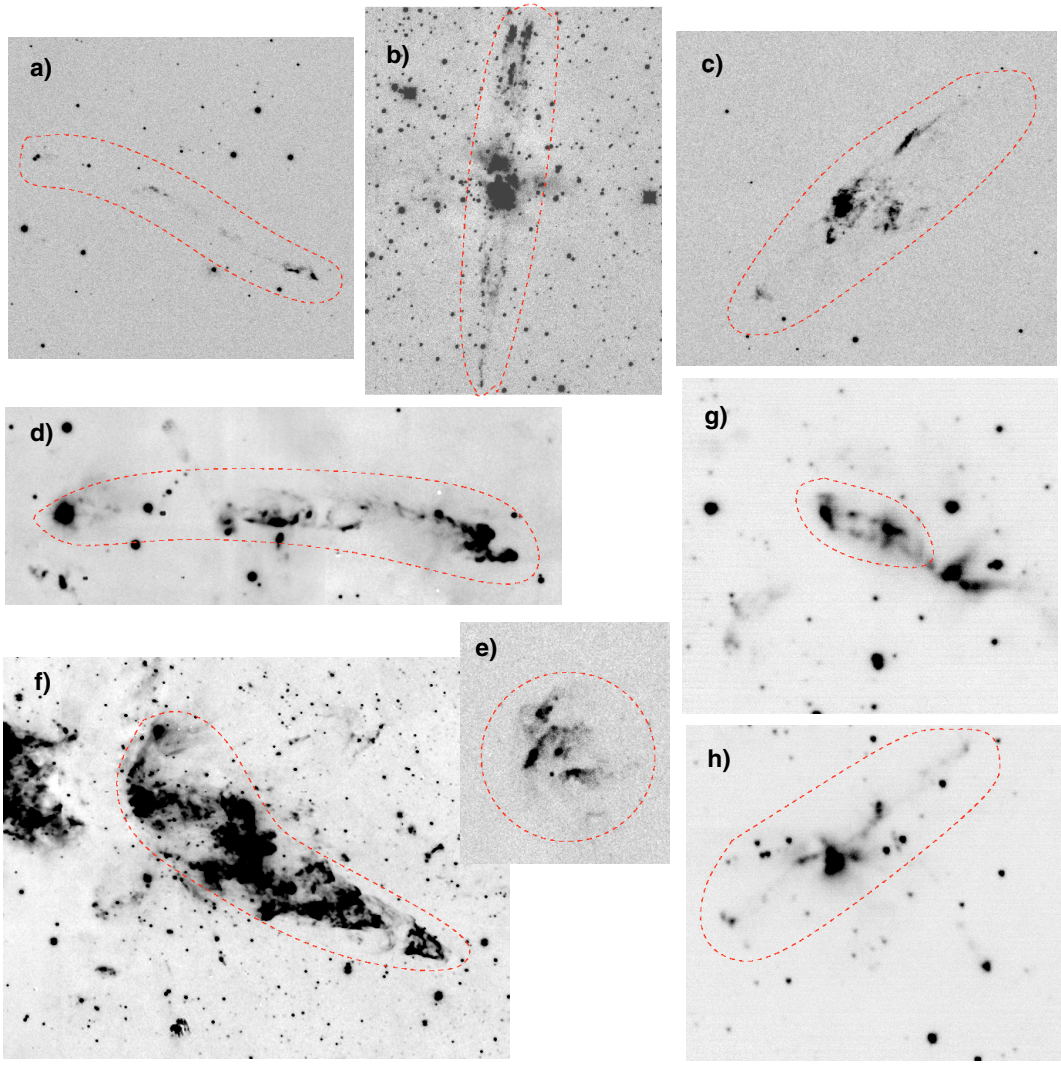

Fig. 5. Examples of the small images available at the MHO web site; in each case the MHO is marked with a red dashed ellipse or circle: **a)** MHO 1300, a curving, collimated jet ∼5′ SW of the main Mon R2 star forming region in Monoceros (from Hodapp 2007); **b)** MHO 1510, a bipolar outflow associated with the bright, nebulous source IRS 20 in Vela (Giannini et al. 2007); **c)** MHO 558 (HH 773), a bright, knotty feature in a bipolar molecular outflow in the B1 ridge in Perseus (Walawender et al. 2009); **d)** MHO 18, a spectacular, knotty outflow in the OMC 2/3 region in Orion A (Yu et al. 1997); **e)** MHO 3000, arcs of emission associated with HH 54 in Chameleon (Zealey et al. 1993); **f)** MHO 899, the luminous south-western molecular flow lobe associated with DR 21 in Cygnus (Davis & Smith 1996); **g)** and **h)** the collimated outflows MHO 2604 and MHO 2201, associated with the high-mass star forming regions IRAS 19410+2336 in Vulpecula and IRAS 18151–1208 in Serpens, respectively (Varricatt et al. 2010).

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Appendix A: Tables of MHOs

In this section we present tables of MHOs separated by region. The regions used to group the MHOs together are defined in Table 1 and in Fig. 4. The very latest versions of these tables are also available on-line at: http://www.jach.hawaii.edu/UKIRT/MHCat/.

Table A.1. A list of all known MHOs in the Orion.

Object[a]	RA[a]	Dec[a]	Other ID[b]	HH[c]	References[d]	Comment	Region
MHO 1	05 35 19.3	–04 55 45	1 – 1/SMZ1	–	1, 2	Two compact knots east and west of a young star in OMC 3	Orion-A
MHO 2	05 35 31.5	–05 00 15	1 – 2/SMZ2	–	1, 2	Faint knotty flow orientated northwest-southeast in OMC 3	Orion-A
MHO 3	05 35 24.5	–05 00 23	YBD36/41/42/50, 1 – 3/SMZ3	–	3, 1, 2	Arcs/filaments in eastern lobe of a bipolar outflow in OMC 3, counter-lobe of MHO 4–6	Orion-A
MHO 4	05 35 17.9	–05 00 35	YBD7, 1 – 4/SMZ3	–	3, 1, 2	Knot and filament extending west of the MHO 3-6 (SMZ 3)outflow sources in OMC 3	Orion-A
MHO 5	05 35 13.0	–05 00 33	YBD2/3, 1 – 5/SMZ3	–	3, 1, 2	East – west group of knots and filaments, part of MHO 3-6(SMZ 3) outflow in OMC 3	Orion-A
MHO 6	05 35 06.6	–05 00 53	YBD1, 1 – 6/SMZ3	–	3, 1, 2	Large, faint bows at western end of MHO 3-6 (SMZ3) outflow in OMC 3	Orion-A
MHO 7	05 35 23.4	–05 01 30	YBD28/30/32, 1 – 7/SMZ4	–	3, 1, 2	Three compact knots in north-south outflow, either side of a young IR source in OMC	Orion-A
MHO 8	05 35 21.1	–05 01 16	YBD13/17, 1 – 8/SMZ5	HH 293	3, 1, 2	Series of compact knots in east-west outflow in OMC 3	Orion-A
MHO 9	05 35 33.6	–05 02 13	1 – 9/SMZ7	–	1, 2	Faint bow in OMC 2/3, possibly associated with MHO 10	Orion-A
MHO 10	05 35 31.8	–05 03 13	YBD76, 1 – 10/SMZ7	–	3, 1, 2	Two faint knots in OMC 2/3, possibly part of the SMZ 7 outflow	Orion-A
MHO 11	05 35 24.7	–05 04 03	YBD27/46, 1 – 11/SMZ6	HH 294	3, 1, 2	Emission associated with Haro 5a/6a bipolar outflow and bright IR reflection nebula	Orion-A
MHO 12	05 35 09.9	–05 03 56	1 – 12/SMZ6	–	1, 2	Large faint bow shocks in western lobe of outflow from Haro 5a/6a (MHO 11/12, SMZ 6)	Orion-A
MHO 13	05 34 42.2	–05 04 18	1 – 13/SMZ6	HH 295	1, 2	Knots/filaments in OMC 2/3, probably extension of MHO 12 flow lobe from Haro 5a/6a	Orion-A
MHO 14	05 35 42.1	–05 04 41	YBD80, 1 – 14/SMZ8	–	3, 1, 2	Bow shock in OMC 2/3 orientated towards the east	Orion-A
MHO 15	05 35 31.6	–05 04 39	YBD75, 1 – 15/SMZ8?	–	3, 1, 2	Group of very faint, compact knots in OMC 2/3, possibly associated with MHO 14	Orion-A
MHO 16	05 35 35.5	–05 05 02	YBD78/79, 1 – 16/SMZ10	HH 287	3, 1, 2	Limb-brightened wings of a northeast-southwest bow shock in OMC 2/3,	Orion-A
MHO 17	05 35 27.6	–05 05 08	1 – 17/SMZ7	–	1, 2	Faint emission elongated northeast-southwest, either side of an IR source in OMC 2/3	Orion-A
MHO 18	05 35 24.2	–05 05 52	YBD4/5/8/15/16/25/29/39/40/ 43/48/54/59/70, 1 – 18/SMZ9	HH 330	3, 1, 2	Bright, east-west orientated outflow in OMC 2/3	Orion-A
MHO 19	05 35 23.8	–05 06 01	1 – 19/SMZ11	–	1, 2	Two bright knots elongated north-south in OMC 2/3, probably associated with MHO 22	Orion-A
MHO 20	05 35 31.9	–05 06 22	YBD74/77, 1 – 20/SMZ14	–	3, 1, 2	Cone of knotty emission in OMC 2/3; may be associated with MHO 25 or MHO 208	Orion-A
MHO 21	05 35 27.6	–05 07 07	YBD61/63, 1 – 21/SMZ12	–	3, 1, 2	Two compact knots elongated north-south; located either side of IR source in OMC 2/3	Orion-A
MHO 22	05 35 22.5	–05 07 18	YBD21/24/31/33/38, 1 – 22/SMZ11/13	–	3, 1, 2	Curving chain of bright, compact knots in OMC 2/3	Orion-A
MHO 23	05 35 17.7	–05 07 22	1 – 23	–	1, 2	Faint, compact knot in OMC 2/3	Orion-A
MHO 24	05 35 20.2	–05 07 55	1 – 24	–	1, 2	Faint, compact knot in OMC 2/3, possibly associated with MHO 22	Orion-A
MHO 25	05 35 25.6	–05 07 57	YBD49/53/58, 1 – 25/SMZ14	HH 383	3, 1, 2	Limb-brightened cavities extending northeast and southwest of IR source in OMC 2/3	Orion-A
MHO 26	05 35 07.2	–05 08 05	1 – 26	–	1, 2	Faint, compact knot in OMC 2/3	Orion-A
MHO 27	05 35 29.1	–05 08 50	YBD67/68/69/71/72/73, 1 – 27/SMZ17/SMZ18	HH 887	3, 1, 2	Bright complex lobe of emission in OMC 2, comprising multiple knots and bow shocks, possibly two flows	Orion-A
MHO 28	05 35 23.2	–05 08 44	YBD23/37, 1 – 28	–	3, 1, 2	Faint knotty filament in OMC 2, possibly associated with MHO 25	Orion-A
MHO 29	05 35 19.6	–05 08 56	1 – 29/SMZ16	–	1, 2	Faint filament or bow shock in OMC 2, possibly associated with MHO 25	Orion-A
MHO 30	05 35 25.4	–05 09 22	YBD51/52, 1 – 30/SMZ19/SMZ20	HH 384	3, 1, 2	Chain of knots in OMC 2 extending west and north of IR sources, possibly two jets	Orion-A
MHO 31	05 35 27.5	–05 09 36	YBD65, 1 – 31/SMZ17	–	3, 1, 2	Bright nebulous region assoc. with embedded star in OMC 2, counter-lobe of MHO 27	Orion-A
MHO 32	05 35 16.1	–05 10 27	YBD6, HH44IR, 1 – 32/SMZ25	HH 44	3, 4, 1, 2	Bright bow-shock/knots in northern lobe of outflow in OMC 2; associated with MHO 39?	Orion-A
MHO 33	05 35 27.7	–05 10 10	1 – 33	–	1, 2	Group of faint compact knots associated with conical, bipolar nebula in OMC 2	Orion-A

Table A.1. continued.

Object[a]	RA[a]	Dec[a]	Other ID[b]	HH[c]	References[d]	Comment	Region
MHO 34	05 35 24.3	–05 10 43	YBD44, 1 – 34	–	3, 1, 2	Faint bow shock feature associated with conical, bipolar nebula in OMC 2	Orion-A
MHO 35	05 35 24.2	–05 11 00	1 – 35	–	1, 2	Two compact knots in OMC 2	Orion-A
MHO 36	05 34 50.4	–05 11 10	1 – 36	–	1, 2	Group of knots/filaments to the west of OMC 2	Orion-A
MHO 37	05 35 27.3	–05 11 51	YBD60/62/64/66, 1 – 37/SMZ21/SMZ22	–	3, 1, 2	Two or three compact knots in a north-south flow in OMC 2	Orion-A
MHO 38	05 35 20.3	–05 14 03	YBD14/18/20, 1 – 38/SMZ23	–	3, 1, 2	Collimated jet and bow shock flowing towards the Southwest in OMC 2	Orion-A
MHO 39	05 35 19.1	–05 11 43	YBD11/12, 1 – 39/SMZ25	HH 535	3, 1, 2	Knotty filament in OMC 2, probably in the same flow lobe as MHO 32	Orion-A
MHO 40	05 35 23.3	–05 12 03	YBD9/10/19/22/26/35, 1 – 40/SMZ24	HH 536	3, 1, 2	Limb-brightened outflow lobe and knots extending towards the southwest in OMC 2	Orion-A
MHO 41	05 34 45.5	–05 12 29	1 – 41	–	1, 2	Faint knot and filament extending towards MHO 36 in OMC 2-west	Orion-A
MHO 42	05 35 20.5	–05 12 41	1 – 42/SMZ25	–	1, 2	Faint compact knots in OMC 2, possibly part of the MHO 32/39 (SMZ 25) outflow lobe	Orion-A
MHO 43	05 35 17.1	–05 13 29	1 – 43, DFS104	–	1, 2	Small group of compact knots in OMC 2	Orion-A
MHO 44	05 35 11.5	–05 20 55	2 – 1	–	1, 2	Small, triangular knot to north-west of the main nebula (Orion “bullet”?)	Orion-A
MHO 45	05 35 02.5	–05 21 50	2 – 2/SMZ26	–	1, 2	Three compact knots to west of the Orion nebula	Orion-A
MHO 46	05 35 09.1	–05 22 50	2 – 3/SMZ26	–	1, 2	Compact knots/bow shock to west of the Orion nebula	Orion-A
MHO 47	05 35 00.0	–05 23 32	2 – 4/SMZ28?	–	1, 2	Small group of knots to west of the Orion nebula	Orion-A
MHO 48	05 35 11.7	–05 23 40	2 – 5/SMZ27/SMZ28	–	1, 2	Chain of knots with southeast-northwest orientation situated to west of the Orion nebula	Orion-A
MHO 49	05 35 09.9	–05 23 46	2 – 6/SMZ28	–	1, 2	Group of features with east-west orientation found to west of the Orion nebula	Orion-A
MHO 50	05 34 38.5	–05 30 14	2 – 7/SMZ29	–	1, 2	Faint features with southeast-northwest orientation in the OMC 4 region	Orion-A
MHO 51	05 35 18.5	–05 31 25	2 – 8/SMZ30	–	1, 2	Two faint knots in OMC 4	Orion-A
MHO 52	05 35 17.3	–05 32 02	2 – 9/SMZ30	–	1, 2	Compact knot in OMC 4	Orion-A
MHO 53	05 35 04.5	–05 33 31	3 – 1, DFS108	HH 541	1, 2	Small, curving jet from embedded source in OMC 4	Orion-A
MHO 54	05 34 43.6	–05 34 06	3 – 2/SMZ29	–	1, 2	Two groups of faint knots/filaments near bright star in OMC 4	Orion-A
MHO 55	05 35 12.1	–05 34 04	3 – 3	–	1, 2	Faint knot in OMC 4	Orion-A
MHO 56	05 35 03.2	–05 34 22	3 – 4	–	1, 2	Two faint knots in OMC 4	Orion-A
MHO 57	05 35 23.7	–05 36 09	3 – 5, DFS109	–	1, 2	Two bow shocks in eastern lobe of outflow found in OMC 4	Orion-A
MHO 58	05 34 29.5	–05 36 05	3 – 6, DFS106	–	1, 2	Faint, curving filament to west of OMC 4	Orion-A
MHO 59	05 34 32.0	–05 37 51	3 – 7, DFS107	–	1, 2	Faint though collimated chain of knots to west of OMC 4	Orion-A
MHO 60	05 35 11.5	–05 39 28	3 – 8/SMZ32	–	1, 2	Group of faint knots, possibly associated with MHO 62 (SMZ 32) in OMC 4	Orion-A
MHO 61	05 34 35.2	–05 39 51	3 – 9/SMZ31	–	1, 2	Compact bipolar outflow from IR source in OMC 4	Orion-A
MHO 62	05 35 11.4	–05 40 13	3 – 10/SMZ32	–	1, 2	Faint knot, possibly associated with MHO 60 (SMZ 32) in OMC 4	Orion-A
MHO 63	05 34 46.6	–05 40 55	3 – 11, DFS111	–	1, 2	Knotty bow shock facing northeastward and situated in OMC 4	Orion-A
MHO 64	05 34 52.5	–05 41 43	3 – 12/SMZ33	–	1, 2	Faint, S-shaped filament in OMC 4	Orion-A
MHO 65	05 35 09.8	–05 43 43	3 – 13/SMZ34	–	1, 2	Grouping of one bright knot and one faint knot in OMC 4	Orion-A
MHO 66	05 34 50.8	–05 44 20	3 – 14/SMZ35	–	1, 2	Two small knots in OMC 4	Orion-A
MHO 67	05 35 10.1	–05 45 05	3 – 15/SMZ36	–	1, 2	Grouping of three knots in OMC 4	Orion-A
MHO 68	05 35 06.2	–05 51 04	3 – 16/SMZ37	–	1, 2	Bow shock and small knot in OMC 5	Orion-A
MHO 69	05 35 04.8	–05 51 51	3 – 17/SMZ38?	–	1, 2	Group of three knots and a filament in OMC 5, may be associated with MHO 70-73	Orion-A
MHO 70	05 35 04.5	–05 52 51	4 – 1/SZM38	–	1, 2	Faint filament in OMC 5, part of MHO 70-73 (SMZ 38)	Orion-A
MHO 71	05 35 05.8	–05 54 11	4 – 2/SMZ38	–	1, 2	Two faint knots in OMC 5, part of MHO 70-73 (SMZ 38)	Orion-A
MHO 72	05 35 08.3	–05 55 30	4 – 3/SMZ38	–	1, 2	Faint filament in OMC 5, part of MHO 70-73	Orion-A
MHO 73	05 35 11.0	–05 56 58	4 – 5/SMZ38/, SMZ39?	–	1, 2	Bow shocks in southern counter-lobe of MHO 70-73 flow in OMC 5	Orion-A
MHO 74	05 35 12.6	–05 56 38	4 – 4/SMZ39	–	1, 2	Compact knots in OMC 5, part of flow that runs orthogonal to MHO 70-73	Orion-A

Table A.1. continued.

Object[a]	RA[a]	Dec[a]	Other ID[b]	HH[c]	References[d]	Comment	Region
MHO 75	05 35 13.1	–05 57 11	4 – 6/SMZ39	–	1, 2	Three compact knots in OMC 5	Orion-A
MHO 76	05 35 10.9	–05 57 37	4 – 7/SMZ39	–	1, 2	Filament with east-west orientation in OMC 5	Orion-A
MHO 77	05 35 03.1	–06 00 42	4 – 8/SMZ39	–	1, 2	Two faint knots adjacent to two bright stars in OMC 5 (can not be seen in this image)	Orion-A
MHO 78	05 35 37.5	–06 02 32	4 – 9/SMZ40	–	1, 2	Filament with east-west orientation in OMC 5	Orion-A
MHO 79	05 35 10.5	–06 03 49	4 – 10/SMZ41	–	1, 2	Knotty, south-facing bow shock in OMC 5	Orion-A
MHO 80	05 35 30.5	–06 12 17	4 – 11/SMZ42	–	1, 2	Faint counter-lobe of MHO 80/81 outflow (SMZ 42) in OMC 5-south	Orion-A
MHO 81	05 35 18.5	–06 13 29	4 – 12/SMZ42	–	1, 2	Jet and bow-shock, associated with MHO 80 in OMC 5-south	Orion-A
MHO 82	05 36 09.3	–06 09 28	5 – 1	–	5, 1, 2	Two faint knots in OMC 5-south	Orion-A
MHO 83	05 35 50.5	–06 10 22	5 – 2/SMZ43	–	5, 1, 2	Arced filament or bubble in OMC 5-south (possibly a PDR)	Orion-A
MHO 84	05 35 43.5	–06 12 20	5 – 3/SMZ44	–	5, 1, 2	Elongated knot in OMC 5-south with bow shock to the southeast	Orion-A
MHO 85	05 36 17.0	–06 11 59	5 – 4/SMZ45	–	5, 1, 2	Collection of faint knots, probably in a north-south orientated flow north of L 1641-N	Orion-A
MHO 86	05 36 36.9	–06 14 41	5 – 5/SMZ46	HH 304	5, 1, 2	Group of knots around a nebulous IR source found to the north of L 1641-N	Orion-A
MHO 87	05 35 39.0	–06 15 24	5 – 6/SMZ47	–	5, 1, 2	Chain of faint, compact knots/bows to the north-west of L 1641-N	Orion-A
MHO 88	05 35 41.8	–06 18 30	5 – 7/SMZ52	HH 324	5, 1, 2	Faint filaments and a bow shock to the north-west of L 1641-N	Orion-A
MHO 89	05 36 18.3	–06 19 42	5 – 8/SMZ49	HH 303	5, 1, 6, 2	Filament a few arcmin north of the L1641-N cluster	Orion-A
MHO 90	05 36 10.8	–06 19 49	5 – 9/SMZ48	HH 299	5, 1, 6, 2	Filament with northeast-southwest orientation near L 1641-N	Orion-A
MHO 91	05 36 02.7	–06 20 03	5 – 10/SMZ52	–	5, 1, 2	Faint filament/two knots with east-west orientation near L 1641-N	Orion-A
MHO 92	05 36 48.2	–06 20 36	5 – 11/SMZ51	–	5, 1, 2	Faint knot to the east of L 1641-N, probably associated with MHO 93 and MHO 98	Orion-A
MHO 93	05 36 38.0	–06 21 29	5 – 12/SMZ51	HH 301	5, 1, 2	Knotty bow shock to the east of L 1641-N, associated with MHO 92 and MHO 98	Orion-A
MHO 94	05 35 26.2	–06 21 10	5 – 13A/SMZ55	–	5, 1, 2	Filament to the west of L 1641-N, associated with MHO 95	Orion-A
MHO 95	05 35 26.5	–06 23 21	5 – 13B/SMZ55	–	1, 2	Faint filament to the west of L 1641-N, associated with MHO 94	Orion-A
MHO 96	05 36 29.5	–06 24 33	5 – 20/SMZ54, DFS115	–	5, 1, 6, 7, 2	Compact knots southeast of L1641-N	Orion-A
MHO 97	05 36 12.2	–06 22 14	5 – 15/SMZ50	–	5, 1, 6, 7, 2	Chain of compact knots orientated north-south, situated just west of L 1641-N	Orion-A
MHO 98	05 36 25.5	–06 22 45	5 – 16/SMZ51	–	5, 1, 6, 7, 2	Two east-west filaments at the base of the MHO 92/93 flow lobe in L 1641-N	Orion-A
MHO 99	05 36 38.8	–06 22 38	5 – 17/SMZ17	–	5, 1, 2	Faint bow shock just east of L 1641-N	Orion-A
MHO 100	05 36 47.8	–06 23 04	5 – 18/SMZ52, DFS115	–	5, 1, 2	Small, faint bows heading east-northeast from L 1641-N; same flow as MHO 102?	Orion-A
MHO 101	05 35 53.3	–06 24 32	5 – 19	–	5, 1, 2	Group of faint knots west of L 1641-N	Orion-A
MHO 102	05 36 29.5	–06 24 33	5 – 20/SMZ54, DFS115	–	5, 1, 6, 2	Compact knots southeast of L1641-N	Orion-A
MHO 103	05 35 29.8	–06 26 58	5 – 21/SMZ55	HH 34	8, 5, 1, 9, 2	Collimated jet and counter jet; well-known HH flow with bows	Orion-A
MHO 104	05 36 35.7	–06 25 49	5 – 22/SMZ54	–	5, 1, 2	Faint emission ~3′ southeast of L 1641-N cluster	Orion-A
MHO 105	05 36 21.5	–06 30 30	5 – 23/SMZ49	–	5, 1, 2	Extensive chain of knots, filaments and bows; part of large flow from the L1641-N cluster	Orion-A
MHO 106	05 35 30.0	–06 28 05	5 – 24/SMZ56	–	5, 1, 2	Collimated north-south jet near HH 34/MHO 103	Orion-A
MHO 107	05 36 56.9	–06 34 18	5 – 25/SMZ57	HH 292	5, 1, 2	Two compact knots to southeast of L 1641-N	Orion-A
MHO 108	05 35 40.0	–06 35 40	5 – 26/SMZ55	HH 86	5, 1, 2	Group of knotty bow shocks to south-west of L 1641-N; extension of MHO 103/HH 34?	Orion-A
MHO 109	05 35 44.0	–06 37 40	5 – 26/SMZ55	HH87/88	5, 1, 2	Group of bow shocks downwind of MHO 108 in the MHO 103/HH 34/ SMZ 55 outflow	Orion-A
MHO 110	05 37 00.1	–06 37 12	5 – 27/SMZ58	–	5, 1, 2	Collimated bipolar jets and sweeping bow shocks to southeast of L 1641-N	Orion-A
MHO 111	05 36 36.1	–06 38 45	5 – 28/6 – 1/SMZ59	–	5, 1,10, 2	Curving bipolar outflow from V 380 Ori-NE, ~8′ northeast of HH 1/2	Orion-A
MHO 112	05 36 30.3	–06 39 56	6 – 2/SMZ49	–	1, 2	Two groups of features to north of HH 1/2, probably an extension of MHO 105/SMZ 49	Orion-A
MHO 113	05 36 22.2	–06 41 50	6 – 3/SMZ60	HH 35	1, 2	Bright though compact knots to north of HH 1/2	Orion-A
MHO 114	05 36 32.1	–06 42 30	6 – 4/SMZ49	–	1, 2	Large groups of arcs and filaments near HH 1/2, a continuation of MHO 105/SMZ 49	Orion-A

Table A.1. continued.

Object[a]	RA[a]	Dec[a]	Other ID[b]	HH[c]	References[d]	Comment	Region
MHO 115	05 36 17.8	–06 42 44	6 – 5/SMZ61	–	1, 2	Faint arc of emission 2–4′ north of HH 1	Orion-A
MHO 116	05 36 11.5	–06 43 04	6 – 6/SMZ62	HH 3	1, 2	Compact bow shock to the north-west of HH 1/2	Orion-A
MHO 117	05 36 23.6	–06 43 12	6 – 7/SMZ60	HH 148	1, 2	Group of faint knots near very bright star in the NGC 1999 (HH 1/2) region	Orion-A
MHO 118	05 36 27.8	–06 43 31	6 – 8	–	1, 2	Small, faint knot southeast of very bright star near HH 1/2	Orion-A
MHO 119	05 36 46.0	–06 44 18	6 – 9, DFS121	HH 36	1, 2	Knotty bow shock ∼5′ northeast of HH 1/2	Orion-A
MHO 120	05 36 20.7	–06 45 14	6 – 10/SMZ62/ SMZ64	HH 1	1, 2, 11, 12, 13, 14, 15, 16	The bright and well-known HH 1 jet and bow shock	Orion-A
MHO 121	05 36 14.3	–06 44 27	6 – 11	–	1, 2	Two faint knots near HH 1/2 (MHO 120/125)	Orion-A
MHO 122	05 36 23.6	–06 45 00	6 – 12/SMZ63	HH 147	12, 2, 1	Arc of knots ∼30″ south-west of IR source in the NGC 1999 (HH 1/2) region	Orion-A
MHO 123	05 36 18.9	–06 45 18	6 – 13/SMZ61	–	1, 2	Small faint knot near HH 1/2 (MHO 120/125)	Orion-A
MHO 124	05 36 19.9	–06 46 00	6 – 14/SMZ65	HH 144	12, 2, 1	Sequence of faint knots/bow shocks with an east-west orientation near HH 1/2	Orion-A
MHO 125	05 36 25.5	–06 47 09	6 – 15/SMZ64	HH 2	11, 12, 2, 14, 1	The bright and well-known HH 2 cluster of knots.	Orion-A
MHO 126	05 36 32.7	–06 53 21	6 – 16/SMZ49, DFS124	–	1, 2	Knotty bow shock facing southeast; a possible extension of HH 1/2 (MHO 120/125)	Orion-A
MHO 127	05 35 53.3	–06 57 00	6 – 17, DFS125	–	1, 2	Two compact knots a few arcmin north of MHO 128 (to south-west of HH 1/2)	Orion-A
MHO 128	05 35 50.0	–07 00 17	6 – 18, DFS125	HH 127	1, 2	Small bow shocks aligned along the same axis as MHO 127	Orion-A
MHO 129	05 38 45.2	–06 59 30	7 – 1/SMZ66	–	1, 2	Faint filament in the L 1641-C cluster, part of collimated MHO 129-132 (SMZ 66) outflow	Orion-A
MHO 130	05 38 48.2	–07 00 15	7 – 2/SMZ66	–	1, 2	Group of compact knots/bows in MHO 129-132 flow in L 1641-C	Orion-A
MHO 131	05 38 52.8	–07 01 01	7 – 3/SMZ66	–	1, 2	Faint knots along MHO 129-132 flow in L 1641-C	Orion-A
MHO 132	05 39 09.7	–07 04 38	7 – 4/SMZ66?	–	1, 2	Faint knot towards southeastern end of MHO 129-132 flow in L 1641-C	Orion-A
MHO 133	05 37 47.0	–07 05 22	7 – 5/SMZ67	HH 64	1, 2	Knotty wing of HH bow shock in extensive HH 38/43/64 outflow	Orion-A
MHO 134	05 37 51.6	–07 06 11	7 – 6/SMZ67	–	1, 2	Filaments along extensive HH 38/43/64 outflow	Orion-A
MHO 135	05 38 00.2	–07 07 31	7 – 7/SMZ67	–	1, 2	Series of small bow shocks along axis of extensive HH 38/43/64 outflow	Orion-A
MHO 136	05 38 04.3	–07 07 55	7 – 8/SMZ68	–	1, 2	Bow shock in flow parallel (and very close to) the HH 38/43/64 system	Orion-A
MHO 137	05 38 05.4	–07 08 25	7 – 9/SMZ67	–	1, 2	Bow shock in the extensive HH 38/43/64 outflow	Orion-A
MHO 138	05 38 11.1	–07 09 28	7 – 10/SMZ67	HH 43	17, 18, 1, 2	Bright complex group of knots and bow shocks in the extensive HH 38/43/64 outflow	Orion-A
MHO 139	05 38 35.0	–07 09 14	7 – 11	–	1, 2	Two compact knots to east of (though not associated with) HH 43	Orion-A
MHO 140	05 39 05.0	–07 10 41	7 – 12/SMZ69	–	1, 2	Faint filament extending west of a young star south of L1641-C	Orion-A
MHO 141	05 39 13.9	–07 11 11	7 – 13, DFS129	–	1, 2	Faint knot or bow shock to the south of a young star in the L1641-C/HH43 area	Orion-A
MHO 142	05 38 21.5	–07 11 35	7 – 14	HH 38	1, 19, 2	Arc of knots in the southeastern lobe of the HH 38/43/64 outflow	Orion-A
MHO 143	05 38 41.5	–07 12 25	7 – 15/SMZ70	HH 449	1, 2	Emission in northern lobe of bipolar nebula in L1641-C/HH43 area, assoc. with MHO 144	Orion-A
MHO 144	05 38 45.3	–07 13 16	7 – 16/SMZ70	–	1, 2	Emission in southern lobe of bipolar nebula in L1641-C/HH43 area, assoc. with MHO 143	Orion-A
MHO 145	05 39 00.6	–07 20 18	8 – 1/SMZ71	–	1, 2	Faint knots and filaments, possibly an extension of HH 38/43/64 (MHO 142/138/133)	Orion-A
MHO 146	05 39 39.5	–07 23 41	8 – 2/SMZ72(?)	–	1, 2	Faint, compact knot, possibly part of MHO 148 (SMZ 72) from Haro 4-255 FIR	Orion-A
MHO 147	05 39 14.2	–07 25 41	8 – 3	–	1, 2	Faint feature ∼2′ northwest of Haro 4-255 FIR	Orion-A
MHO 148	05 39 22.5	–07 25 59	8 – 4/SMZ72	HH 469	20, 1, 2	Knotty jets and bow shocks from Haro 4-255 FIR	Orion-A
MHO 149	05 39 28.3	–07 26 14	8 – 5	–	1, 2	Single knot to east of Haro 4-255 FIR	Orion-A
MHO 150	05 39 28.9	–07 28 14	8 – 6/SMZ73	HH 470	1, 2	HH bow shock from cTTS Haro 4-255, very faint in H2 emission	Orion-A
MHO 151	05 38 50.3	–07 32 00	8 – 7/SMZ72?	–	1, 2	Single knot, possible part of the counter-flow from Haro 4-255 FIR (MHO 148/SMZ 72)	Orion-A
MHO 152	05 40 24.8	–07 20 22	9 – 1/SMZ74	–	1, 2	Small group of faint features orientated northeast-southwest; situated north of MHO 155-157	Orion-A
MHO 153	05 40 10.7	–07 21 45	9 – 2/SMZ74	–	1, 2	Three compact knots north of the major MHO 155-157 flow, possibly associated with MHO 152	Orion-A
MHO 154	05 40 25.8	–07 22 14	9 – 3/SMZ75/SMZ76?	–	1, 2	Two conical bow shocks just to the north of the major MHO 155-157 flow	Orion-A
MHO 155	05 40 41.9	–07 23 41	9 – 4/SMZ76	–	1, 2	Spectacular knotty, curving filament near Re 50, probably associated with MHO 156 and MHO 157	Orion-A

Table A.1. continued.

Object[a]	RA[a]	Dec[a]	Other ID[b]	HH[c]	References[d]	Comment	Region
MHO 156	05 40 28.2	–07 24 47	9 – 5/SMZ76	–	1, 2	Fainter knots and filaments that bridge the gap between MHO 155 and MHO 157	Orion-A
MHO 157	05 40 15.9	–07 24 25	9 – 6/SMZ76	HH 65	1, 2	Large, curving chain of bow shocks and knots near Re 50, associated with MHO 155 and MHO 156	Orion-A
MHO 158	05 40 21.2	–07 27 15	9 – 7, DFS131	–	1	Three knots near Re 50, probably part of a northeast-pointing bow shock	Orion-A
MHO 159	05 40 25.0	–07 27 57	9 – 8	–	1, 2	Three faint knots/features close to Re 50/Re 50N	Orion-A
MHO 160	05 40 18.2	–07 27 48	9 – 9	–	1, 2	Faint filament extending south west from knot to west of Re 50N, possibly associated with MHO 158	Orion-A
MHO 161	05 40 29.6	–07 28 32	9 – 10	–	1, 2	Three faint wisps between Re 50 and Re 50N	Orion-A
MHO 162	05 39 52.7	–07 31 25	9 – 11/SMZ76	–	1, 2	Three knotty features to south-west of Re 50, probably part of counter-flow to MHO 155-157	Orion-A
MHO 163	05 39 50.3	–07 33 27	9 – 13/SMZ76	–	1, 2	Group of knots and wisps of emission to south-west of Re 50, roughly aligned with MHO 162	Orion-A
MHO 164	05 39 44.3	–07 33 34	9 – 12/SMZ76	–	1, 2	Snaking chain of knots to south-west of Re 50	Orion-A
MHO 165	05 39 40.7	–07 35 25	9 – 14/SMZ76	–	1, 2	Arcuate knots and wisps of emission to south-west of Re 50	Orion-A
MHO 166	05 39 46.3	–07 36 53	9 – 15/SMZ76	–	1, 2	Diffuse emission to south-west of Re 50	Orion-A
MHO 167	05 34 28.4	–04 55 13	DFS101	–	2	Curving, collimated, knotty bipolar outflow to west of OMC 3	Orion-A
MHO 168	05 36 05.3	–05 04 41	HH128IR – 1/2/3, HH129IR, DFS102	HH 42	21, 4, 2	Bright bow shock and diffuse emission east of OMC 2/3	Orion-A
MHO 169	05 35 24.4	–05 08 39	YBD45, DFS103	–	3, 2	Two adjacent, compact knots/bow shocks in OMC 2	Orion-A
MHO 170	05 33 58.9	–05 21 54	DFS105	–	2	Bow shock with extended wings situated to west of the Orion nebula	Orion-A
MHO 171	05 32 41.6	–05 35 46	DFS110	–	2	Arc of bright knots, associated with Haro 4-145 and found west of the main OMC 1/2/3 ridge	Orion-A
MHO 172	05 32 27.7	–05 34 55	DFS114	–	2	Faint, curving filament 4–5′ west of Haro 4-145 and MHO 171	Orion-A
MHO 173	05 32 21.9	–05 34 53	DFS114	–	2	Faint, diffuse feature near MHO 172	Orion-A
MHO 174	05 32 22.7	–05 36 43	DFS114	–	2	Faint knots near MHO 172	Orion-A
MHO 175	05 35 33.7	–05 45 12	DFS112	–	2	Conical bow shock pointing towards the Southeast in OMC 4	Orion-A
MHO 176	05 34 59.7	–05 52 40	DFS113	–	2	Faint, very diffuse, bow-shaped feature in OMC 4/5	Orion-A
MHO 177	05 35 20.9	–06 18 23	DFS116	HH 40	11, 22, 2	Bright, elongated knot better known as HH 40	Orion-A
MHO 178	05 35 17.8	–06 17 39	DFS116	HH 33	11, 22, 2	Bright bow shock with diffuse emission; associated with HH 40/MHO 177	Orion-A
MHO 179	05 34 10.9	–06 33 39	DFS117	HH 84	2	Arc of emission to west of L 1641, possibly part of counter-flow to HH 83	Orion-A
MHO 180	05 34 12.4	–06 34 27	DFS117	–	2	Compact arcuate knots ∼1′ Southeast of MHO 179/HH 84	Orion-A
MHO 181	05 33 32.3	–06 29 40	DFS117	HH 83	9, 2	Well-known outflow source and collimated, knotty jet, HH 83	Orion-A
MHO 182	05 36 22.1	–06 23 46	DFS118	–	2	Two small, nested bow shocks ∼20″ south of protostar in L 1641-N	Orion-A
MHO 183	05 35 49.9	–06 34 54	DFS119	–	2	Compact knot next to protostar	Orion-A
MHO 184	05 37 46.8	–06 53 32	DFS120	–	2	Two faint knots	Orion-A
MHO 185	05 37 51.1	–06 47 30	DFS122	–	2	Compact/faint knots in counter-flow to MHO 186/HH 89; to east of NGC 1999 (HH 1/2) region	Orion-A
MHO 186	05 37 47.2	–06 45 57	DFS122	HH 89	2	Collimated jet to east of NGC 1999 region, associated with conical nebula and MHO 185	Orion-A
MHO 187	05 37 32.4	–06 50 20	DFS123	–	2	Bright, complex, knotty structure located east of NGC 1999; part of MHO 187-189	Orion-A
MHO 188	05 37 14.6	–06 49 40	DFS123	–	2	Arc/bow shock and filament, part of MHO 187-189	Orion-A
MHO 189	05 37 03.8	-06 49 43	DFS123	–	2	Large, filamentary bow shocks, part of MHO 187-189	Orion-A
MHO 190	05 37 05.4	–06 55 58	DFS126	–	2	Bright bow to southeast of NGC 1999; extension of HH 38/43/64 (MHO 133/138/142)?	Orion-A
MHO 191	05 37 56.8	–06 56 41	DFS127	–	2	Compact knot with tail near protostar	Orion-A
MHO 192	05 37 59.0	–07 13 16	DFS128	–	2	Compact knots and (possible) faint bow shock to south	Orion-A
MHO 193	05 40 10.4	–07 10 42	DFS130	–	2	Southeast-facing bow shock with extended wing	Orion-A
MHO 194	05 39 10.2	–07 39 40	DFS132	–	2	Large bright complex of knots, filaments and bow shocks; possible counter-flow to MHO 155-157	Orion-A
MHO 195	05 38 47.9	–07 40 46	DFS132	–	2	Arc of emission, probably associated with MHO 194	Orion-A
MHO 196	05 41 06.2	–08 00 15	DFS134	–	2	Northward-facing bow shocks in collimated flow	Orion-A
MHO 197	05 40 47.6	–08 04 37	DFS135	–	2	Collimated jet and bow shock (in counter-flow?) from bright IR source in L 1641-S	Orion-A

Table A.1. continued.

Object[a]	RA[a]	Dec[a]	Other ID[b]	HH[c]	References[d]	Comment	Region
MHO 198	05 40 47.5	–08 06 45	DFS138	–	2	Features near source of large MHO 201/202/203 bipolar outflow	Orion-A
MHO 199	05 41 06.0	–08 06 39	DFS136	–	2	Faint, knotty flow that crosses MHO 200 in L 1641-S	Orion-A
MHO 200	05 41 06.9	–08 06 08	DFS137	–	2	Faint flow that crosses MHO 199 in L 1641-S	Orion-A
MHO 201	05 41 12.7	–08 12 05	DFS138	–	2	Knots and filaments in southeastern lobe of large bipolar flow (MHO 201-203) in L 1641-S	Orion-A
MHO 202	05 40 32.5	–08 03 38	DFS138	–	2	Extended knots in northwestern lobe of bipolar flow (MHO 201-203) in L 1641-S	Orion-A
MHO 203	05 40 12.2	–08 02 07	DFS138	–	2	Small group of knots in L 1641-S, possibly in the same flow lobe as MHO 202	Orion-A
MHO 204	05 41 24.8	–08 12 45	DFS139	–	2	Faint, curving filament in L 1641-S	Orion-A
MHO 205	05 42 31.7	–08 01 20	DFS140	–	2	Elongated fingers of emission to east of the L 1641-S region	Orion-A
MHO 206	05 39 48.5	–08 01 42	DFS142	–	2	Compact knots and faint bow shock to west of the L 1641-S region	Orion-A
MHO 207	05 39 41.8	–08 02 54	DFS142	–	2	Faint knots and filament to west of the L 1641-S region, possibly assoc. with MHO 206	Orion-A
MHO 208	05 35 22.5	–05 08 03	YBD34, 1 – 22/SMZ15	HH 385	3, 1, 2	Bright, compact knots in OMC 2/3	Orion-A
MHO 209	05 35 25.7	–05 14 29	YBD56	–	3	Faint, compact knots in OMC 2/3	Orion-A
MHO 210	05 36 02.1	–05 02 53	HH41IR	–	4	Faint feature in OMC 2/3	Orion-A
MHO 211	05 19 58.9	–05 52 20	[HL]10/8/11	HH 241	23, 24, 25	Knotty bow shocks in eastern lobe of bipolar outflow in L 1634 (assoc. with MHO 212)	Orion-A
MHO 212	05 19 38.9	–05 51 29	[HL]1/2/3	HH 240	23, 24, 25	Nested bow shocks in western lobe of bipolar outflow in L 1634 (assoc. with MHO 211)	Orion-A
MHO 213	05 19 56.9	–05 53 15	[HL]9	–	23	Faint feature northwest of the MHO 211/212 (assoc. with MHO 214?)	Orion-A
MHO 214	05 19 45.9	–05 50 49	[HL]4	–	23	Faint feature southeast of the MHO 211/212 flow (assoc. with MHO 213?)	Orion-A
MHO 215	05 36 18.4	–06 21 12	5 – 14/SMZ49/SMZ53	–	5, 1, 6, 7, 2	Part of a complex group; associated with at least two outflows in the L1641-N cluster	Orion-A
MHO 216	05 36 19.3	–06 21 28	5 – 14/SMZ49/SMZ53	–	20, 5, 1, 6, 7, 2	Part of a complex group; associated with at least two outflows in the L1641-N cluster	Orion-A
MHO 217	05 36 20.2	–06 21 42	5 – 14/SMZ49/SMZ53	–	20, 5, 1, 6, 7, 2	Part of a complex group; associated with at least two outflows in the L1641-N cluster	Orion-A
MHO 218	05 36 18.5	–06 21 40	5 – 14/SMZ49/SMZ53	–	20, 5, 1, 6, 7, 2	Part of a complex group; associated with at least two outflows in the L1641-N cluster	Orion-A
MHO 219	05 36 19.2	–06 21 48	5 – 14/SMZ49/SMZ53	–	20, 5, 1, 6, 7, 2	Part of a complex group; associated with at least two outflows in the L1641-N cluster	Orion-A
MHO 220	05 36 17.9	–06 21 49	5 – 14/SMZ49/SMZ53	–	20, 5, 1, 6, 7, 2	Part of a complex group; associated with at least two outflows in the L1641-N cluster	Orion-A
MHO 221	05 36 18.3	–06 21 58	5 – 14/SMZ49/SMZ53	–	20, 5, 1, 6, 7, 2	Part of a complex group; associated with at least two outflows in the L1641-N cluster	Orion-A
MHO 222	05 36 19.7	–06 23 25	5 – 14/SMZ49/SMZ53	–	20, 5, 1, 6, 7, 2	Part of a complex group; associated with at least two outflows in the L1641-N cluster	Orion-A
MHO 223	05 42 47.8	–08 17 03	–	–	26	Knotty bow shock to east of IRAS 05403+0818 in L 1641-S	Orion-A

Notes. [(a)] Catalogue reference for the Molecular Hydrogen emission-line Object (MHO), with coordinates. [(b)] Other acronyms and labels used in the literature.
[(c)] Associated Herbig-Haro object, if any. [(d)] References to papers presenting near-IR images, listed chronologically (including papers citing other IDs); see the full list of references at the end of Table A15.

Table A.2. A list of all known MHOs in Orion B.

Object[a]	RA[a]	Dec[a]	Other ID[b]	HH[c]	References[d]	Comment	Region
MHO 300	05 47 07.3	+00 22 40	IA	–	27, 28	Main northeastern lobe of large NGC 2071 bipolar outflow	Orion-B
MHO 301	05 46 59.0	+00 20 30	IB	–	27, 28	southwestern lobe of large bipolar outflow in NGC 2071 (counter-flow to MHO 300)	Orion-B
MHO 302	05 47 05.5	+00 21 45	IIA/IIB	–	27, 28	Emission near IR source of MHO 300/301 (in NGC 2071 region)	Orion-B
MHO 303	05 47 02.5	+00 22 30	III	–	27, 28	Chain of knots and features extending to northwest from NGC 2071	Orion-B
MHO 304	05 47 03.7	+00 22 50	IVA	–	28	Fainter jet running northeast-southwest, parallel with MHO 300/301 in NGC 2071	Orion-B
MHO 305	05 47 09.5	+00 24 30	IVB	–	28	Possible extension of MHO 304 flow in NGC 2071	Orion-B
MHO 306	05 47 08.9	+00 24 00	V	–	28	Small group of features in NGC 2071	Orion-B
MHO 307	05 47 11.0	+00 23 45	–	–	28	Extension of large MHO 300 flow in NGC 2071	Orion-B
MHO 308	05 47 12.3	+00 22 00	VI	–	28	20″ long jet to east of main MHO 300/301 flow in NGC 2071	Orion-B
MHO 309	05 46 59.0	+00 19 20	VII	–	28	Bow-shaped structure to south of large MHO 301 flow lobe in NGC 2071	Orion-B
MHO 310	05 47 14.0	+00 18 15	VIII	–	28	1′ long jet in southeast corner of NGC 2071 region	Orion-B
MHO 311	05 47 01.3	+00 25 50	XIA	–	28	North-south chain of knots in northwest corner of NGC 2071 (assoc. with MHO 309?)	Orion-B
MHO 312	05 47 02.7	+00 28 10	XIB	–	28	Filamentary structure in northwest NGC 2071, possible counter-flow to MHO 311	Orion-B
MHO 313	05 46 59.0	+00 26 15	XIIA	–	28	Small jet in northwest NGC 2071, counter-flow to MHO 314	Orion-B
MHO 314	05 47 02.5	+00 26 45	XIIB	–	28	Small jet in northwest NGC 2071, counter-flow to MHO 313	Orion-B
MHO 315	05 41 58.2	–01 13 36	HH91A – V	HH 91	29	Bright, knotty HH object	Orion-B
MHO 316	05 41 48.2	–01 13 37	HH91X – Z	HH 91	29	Fainter curving filament, assoc. with MHO 315	Orion-B
MHO 317	05 51 25.3	+02 55 15	–	HH 110	29, 30, 31	Collimated, knotty HH jet	Orion-B
MHO 318	05 51 21.0	+02 55 45	IRS2	–	29, 31	Bipolar jet from IR source situated to northwest of HH 110 (MHO317)	Orion-B
MHO 319	05 51 20.7	+02 55 27	IRS1	–	29, 31	Second north-south jet near HH 110, from IRAS 05487+0255	Orion-B
MHO 320	05 51 46.1	+02 48 30	F, H, L, P, $CJ_1 - CJ_3$	HH 111	9, 29, 32, 33, 34, 35, 36	Well-known collimated, knotty, bipolar HH jet and molecular outflow	Orion-B
MHO 321	05 51 46.5	+02 48 30	B, C, X, Y, Z	HH 121	32, 33, 29, 36, 35	Knots in collimated flow that runs orthogonal to HH 111	Orion-B
MHO 322	05 46 07.8	–00 11 56	–	–	24	Faint arc extending northward from SSV 61 in L 1630 (HH 24-26)	Orion-B
MHO 323	05 46 09.3	–00 10 24	–	HH 24A	37, 24, 38	Small jet from embedded Class 0 source in L 1630	Orion-B
MHO 324	05 46 08.0	–00 10 03	–	HH 24B	24, 38	Finger of emission associated with SSV 63W IR source in L 1630	Orion-B
MHO 325	05 46 07.3	–00 13 25	–	HH 25	24, 38, 21, 22	Knotty, curving, bipolar flow that crosses HH 26 (MHO 326) in L 1630	Orion-B
MHO 326	05 46 05.0	–00 14 37	–	HH 26	24 38, 21, 22	Curving bipolar outflow that crosses HH 25 (MHO 325) in L 1630	Orion-B
MHO 327	05 54 09.8	+02 37 09	A, B, C	HH 182A	39	Small group of faint knots/arcs	Orion-B
MHO 328	05 18 16.8	+07 11 00	–	–	26	Bow shock to west of nebulous source IRAS 05155+0707	Orion-B
MHO 329	05 18 14.6	+07 11 06	–	–	26	Fainter, knotty bow shock to west of IRAS 05155+0707 (downwind of MHO 328)	Orion-B
MHO 330	05 18 12.8	+07 11 21	–	–	26	Group of knots/filaments to west of IRAS 05155+0707; assoc. with MHO 327/328?	Orion-B
MHO 331	05 45 49.6	–00 05 12	–	HH 19	11	Group of knots assoc with complex HH object	Orion-B
MHO 332	05 46 11.0	–00 09 25	D, G, N	HH 24	40	Faint bows extending northeastward from the main HH 24 region	Orion-B
MHO 499	05 43 51.3	–01 02 55	–	HH 212	41, 42, 43	Spectacular twin jets and bow shocks emanating from an embedded protostar	Orion-B

Notes. [(a)] Catalogue reference for the Molecular Hydrogen emission-line Object (MHO), with coordinates. [(b)] Other acronyms and labels used in the literature. [(c)] Associated Herbig-Haro object, if any. [(d)] References to papers presenting near-IR images, listed chronologically (including papers citing other IDs); see the full list of references at the end of Table A15.

Table A.3. A list of all known MHOs in Perseus.

Object[a]	RA[a]	Dec[a]	Other ID[b]	HH[c]	References[d]	Comment	Region
MHO 501	03 28 57.6	+31 25 32	[DSL]68	–	44	Faint knots to north of NGC 1333	Perseus
MHO 502	03 29 00.5	+31 24 03	[DSL]40/69	–	44	Chain of faint features/bow shocks to north of NGC 1333	Perseus
MHO 503	03 29 03.8	+31 21 57	[DSL]39	–	44	Small features near bright nebulosity in NGC 1333	Perseus
MHO 504	03 29 07.6	+31 21 04	[DSL]70	–	44	Faint emission in NGC 1333	Perseus
MHO 505	03 28 57.7	+31 20 20	[DSL]38	HH 12	27, 45, 44	Spray of bright knots to west of nebulous source in NGC 1333	Perseus
MHO 506	03 29 01.3	+31 19 06	[DSL]37	–	44	Faint filaments in NGC 1333	Perseus
MHO 507	03 28 59.2	+31 18 51	[DSL]37	–	44	Faint filaments in NGC 1333	Perseus
MHO 508	03 29 12.1	+31 18 34	[DSL]36	HH 6	44	Bright cone of knots in NGC 1333	Perseus
MHO 509	03 29 09.1	+31 18 25	[DSL]36	HH 6	44	Faint, diffuse emission, possibly associated with MHO 508	Perseus
MHO 510	03 28 42.9	+31 17 45	[DSL]61	–	44	Faint emission near young star to west of NGC 1333	Perseus
MHO 511	03 29 00.7	+31 16 58	[DSL]35	HH 753	27, 44	Complex counter-flow to MHO 512/HH 7-11	Perseus
MHO 512	03 29 08.2	+31 15 30	HL7, [DSL]60	HH 7-11	27, 45, 46, 47, 48, 22, 38, 44, 49, 50, 51, 52, 53	Well-known, bright HH/molecular outflow lobe in NGC 1333	Perseus
MHO 513	03 29 14.4	+31 14 45	ASR57, HL10/11, [DSL]67/33	HH 347	53, 47, 52, 44	Bright arc of emission, may be associated with MHO 512/HH 7-11 or MHO 514	Perseus
MHO 514	03 29 15.0	+31 15 23	HL10, 11, CHH2, [DSL]67	HH 347	47, 52, 44	Faint filaments, possibly associated with MHO 513	Perseus
MHO 515	03 29 02.4	+31 15 02	ASR20, 21, CHH6, [DSL]34	–	53, 52, 44	Faint emission extending southward towards MHO 519 in NGC 1333	Perseus
MHO 516	03 28 56.1	+31 15 47	ASR15, 16, [DSL]32	–	53, 44	Bright knot/bow in outflow from protostar in NGC 1333, assoc. with MHO 517	Perseus
MHO 517	03 28 53.9	+31 13 24	ASR49, 79, [DSL]31	–	53, 44	Bow shocks in outflow from protostar in NGC 1333, associated with MHO 516	Perseus
MHO 518	03 28 36.9	+31 13 31	[DSL]20/46	HH 339?	44	S-shaped bipolar outflow from young star in western NGC 1333	Perseus
MHO 519	03 29 05.5	+31 12 51	ASR73, HL4, [DSL]30	–	47, 52, 44	Knotty arc of emission that crosses MHO 520 in southern NGC 1333	Perseus
MHO 520	03 29 06.9	+31 12 15	ASR57, HL3, 5, 6, CHH15 – 19, [DSL]29	–	47, 52, 44	Knotty filament that crosses MHO 519 in southern NGC 1333	Perseus
MHO 521	03 29 20.2	+31 12 50	CHH7 – 9, [DSL]44	HH 5	52, 44	Southward-facing bow shocks in southeastern NGC 1333	Perseus
MHO 522	03 29 10.1	+31 11 44	HL8, CHH11, [DSL]26	–	47, 52, 44	Eastward-facing bow shocks, counter-flow to MHO 524 in NGC 1333	Perseus
MHO 523	03 28 58.8	+31 12 19	ASR98, [DSL]28	HH 344	53, 44	Knotty bow shock heading south from conical nebulosity in NGC 1333	Perseus
MHO 524	03 28 51.8	+31 12 23	ASR97, [DSL]27	–	53, 44	West-facing bow shock, counter-flow to MHO 522 in NGC 1333	Perseus
MHO 525	03 28 33.3	+31 12 14	[DSL]66	HH 744B	44	Faint, compact knots to south-west of NGC 1333; an extension of MHO 524?	Perseus
MHO 526	03 28 52.0	+31 10 48	[DSL]21	HH 342	44	Small knots to south of NGC 1333	Perseus
MHO 527	03 28 50.2	+31 10 24	[DSL]21	HH 341?	44	Faint filament to south of NGC 1333	Perseus
MHO 528	03 28 50.8	+31 09 26	[DSL]21	HH 341	44	Faint emission to south of NGC 1333	Perseus
MHO 529	03 28 59.0	+31 08 06	[DSL]24	HH 15	44	Bright, elongated knots south of NGC 1333, possibly wings of MHO 530 bow	Perseus
MHO 530	03 28 56.6	+31 07 37	[DSL]43	–	44	Bright, knotty, southward-facing bow shocks south of NGC 1333	Perseus
MHO 531	03 28 45.8	+31 07 34	[DSL]41/42	HH 13	44	Group of faint bow shocks south of NGC 1333	Perseus
MHO 532	03 28 45.1	+31 05 41	[DSL]22/23/62	HH 340	54, 44	S-shaped bipolar outflow south of NGC 1333	Perseus
MHO 533	03 29 25.7	+31 07 26	[DSL]25	HH 18	44	Group of knotty bows SSE of NGC 1333, an extension of MHO 521?	Perseus
MHO 534	03 28 49.4	+31 00 11	[DSL]19	HH 14	44	Series of knots and bow shocks further south of NGC 1333 (moving south?)	Perseus
MHO 535	03 28 32.6	+30 50 30	[DSL]18	HH 746	44	Faint bow shocks further south of the main NGC 1333 cluster	Perseus
MHO 536	03 28 12.9	+31 19 44	[DSL]71	HH 338	44	Small bow shock and associated emission to west of NGC 1333	Perseus
MHO 537	03 25 36.8	+30 45 15	[DSL]82	HH 197	55, 56, 44, 57, 28, 40	Cone of knots in flow parallel to MHO 538/539 in L 1448	Perseus

Table A.3. continued.

Object[a]	RA[a]	Dec[a]	Other ID[b]	HH[c]	References[d]	Comment	Region
MHO 538	03 25 41.0	+30 42 20	[DSL]77	–	55, 56, 44, 57, 28	Southern lobe of bipolar flow in L 1448, associated with MHO 539	Perseus
MHO 539	03 25 38.1	+30 44 36	[DSL]76	–	55, 56, 44, 57, 28, 40	Bright, northern lobe of bipolar flow in L 1448, counter-flow to MHO 538	Perseus
MHO 540	03 25 25.6	+30 46 55	[DSL]80	HH 196D	28, 44	Faint emission/bow, possible extension of curving MHO 539 lobe in L 1448	Perseus
MHO 541	03 25 12.7	+30 49 22	[DSL]78	HH 196	28, 44	Knots/bow shocks, possibly extension of MHO 539/540 in L 1448	Perseus
MHO 542	03 24 52.7	+30 54 47	[DSL]79	HH 193	44	Complex group of objects to northwest of main flows in L 1448	Perseus
MHO 543	03 25 27.1	+30 45 50	[DSL]75	–	28, 44	Chain of features parallel with MHO 539 in L 1448	Perseus
MHO 544	03 25 26.7	+30 44 04	[DSL]72	–	28, 44	Bows in bipolar flow from protostar in L 1448-west; counter-flow to MHO 545	Perseus
MHO 545	03 25 14.9	+30 46 54	[DSL]74	HH 195	28, 26, 44	Bows in MHO 544 counter-lobe in L 1448-west (near IRAS 03220+3035)	Perseus
MHO 546	03 25 17.6	+30 45 49	[DSL]73	–	28, 44	Complex group of knots to west of bipolar flow MHO 544/545 in L 1448	Perseus
MHO 547	03 24 58.0	+30 47 42	[DSL]81	HH 194	44	Small knot to west of (and possibly associated with) MHO 546	Perseus
MHO 548	03 24 26.7	+30 56 44	[DSL]83	–	44	Faint emission to north-west of L 1448	Perseus
MHO 549	03 24 02.8	+31 00 25	[DSL]84	HH 267	44	Complex group of knots to north-west of L 1448	Perseus
MHO 550	03 33 33.5	+31 08 40	MH1, [DSL]5	–	58, 44, 59	Bright knot and tail in S-shaped bipolar flow; assoc. with MHO 551 in B1	Perseus
MHO 551	03 33 07.7	+31 09 59	MH2, [DSL]6/7/8	–	58, 44, 59	Group of knots in S-shaped bipolar flow from protostar, counter-flow to MHO 550 in B1	Perseus
MHO 552	03 33 13.4	+31 08 19	MH3, [DSL]64	–	58, 44, 59	Small knot in B1 cloud	Perseus
MHO 553	03 33 15.7	+31 07 55	MH4, [DSL]10	–	58, 44, 59	Faint emission in bipolar molecular outflow from young star in B1	Perseus
MHO 554	03 33 18.7	+31 07 14	MH5, [DSL]9	–	58, 44, 59	Faint, elongated emission features near young star in B1	Perseus
MHO 555	03 32 11.9	+30 50 52	[DSL]2, MH21/22	–	44, 59	Long, faint feature in B1 ridge, possibly associated with MHO 556	Perseus
MHO 556	03 32 26.9	+30 48 14	[DSL]3, MH23	–	44, 59	Knots/features in B1 ridge, possibly associated with MHO 555 and/or MHO 557	Perseus
MHO 557	03 32 38.9	+30 44 16	[DSL]4, MH24	–	44, 59	Knot and associated diffuse emission, possibly linked to MHO 556	Perseus
MHO 558	03 31 31.0	+30 44 11	[DSL]49, MH20	HH 773	60, 61, 44, 59	Bright feature in outflow, assoc. with MHO 559 in B1 ridge (near IRAS 03282+3035)	Perseus
MHO 559	03 31 02.9	+30 47 48	[DSL]50, MH19	–	44, 59	Faint bow shocks in counter-flow to MHO 558 in the B1 ridge (near IRAS 03282+3035)	Perseus
MHO 560	03 31 47.9	+31 10 00	[DSL]53	HH 429	44	West-facing bow shocks in the B1 ridge	Perseus
MHO 561	03 30 33.4	+30 27 47	[DSL]51	HH 370	44	Small knots near bright star in the B1 ridge	Perseus
MHO 562	03 30 45.8	+30 29 19	[DSL]52	HH 372	44	Knots in the B1 ridge region	Perseus
MHO 563	03 28 39.9	+30 02 05	[DSL]85	–	44	Complex group of knots and emission in the B1 ridge region	Perseus
MHO 564	03 27 47.9	+30 12 02	[DSL]14/54	HH 422	44	Faint knots of emission to north and south of nebulous young star in L 1455	Perseus
MHO 565	03 27 44.5	+30 14 15	[DSL]17/55	HH 318	24, 44	Knots in bipolar outflow from young star RNO 15-FIR in L 1455, counter-flow to MHO 566	Perseus
MHO 566	03 27 38.1	+30 12 49	[DSL]15/16	–	24, 44	Small bow and fainter knots in flow from RNO 15-FIR in L 1455, counter-flow to MHO 565	Perseus
MHO 567	03 27 43.0	+30 12 29	[DSL]59	–	44	Faint emission in bipolar molecular outflow in L 1455	Perseus
MHO 568	03 27 18.5	+30 17 16	[DSL]12/13	HH 279	44	Complex, curving emission to north-west on L 1455	Perseus
MHO 569	03 26 58.9	+30 18 40	[DSL]11	–	44	Curving chain of knots/bow shocks further north-west in L 1455; assoc. with MHO 568?	Perseus
MHO 570	03 27 12.9	+30 11 59	[DSL]58	HH 317	44	Faint filament in L 1451	Perseus
MHO 571	03 26 56.9	+30 14 14	[DSL]57	HH 317D	44	Faint feature in L 1451	Perseus
MHO 572	03 26 49.1	+30 14 57	[DSL]56	HH 493	44	Faint bow shocks/features in L 1451	Perseus
MHO 573	03 33 27.4	+31 07 10	MH12, [DSL]1	–	58, 44, 59	Very faint emission associated with nebulous young star in B1	Perseus
MHO 574	03 28 59.5	+31 14 23	HL2, [DSL]45	–	47, 44	Faint arc/bow shock in NGC 1333	Perseus

Table A.3. continued.

Object[a]	RA[a]	Dec[a]	Other ID[b]	HH[c]	References[d]	Comment	Region
MHO 575	03 29 27.3	+31 13 30	[DSL]47	–	44	Compact, elongated knot to east of NGC 1333, possibly an extension of MHO 512 (HH 7-11)	Perseus
MHO 576	03 29 10.9	+31 19 54	[DSL]48	–	44	Knot with diffuse emission in NGC 1333, possibly associated with MHO 504	Perseus
MHO 577	03 33 35.8	+31 08 46	MH7, [DSL]63	–	58, 44, 59	Very faint arc in B1	Perseus
MHO 578	03 29 15.3	+31 17 03	[DSL]65	–	44	Faint group of knots in NGC 1333	Perseus
MHO 579	03 32 53.4	+31 02 22	MH6	–	58	Small faint knot to south-west of B1	Perseus
MHO 580	03 33 41.0	+31 06 23	MH8	–	58, 59	Faint arc to southeast of B1	Perseus
MHO 581	03 33 46.1	+31 05 48	MH9	–	58, 59	Faint filament to southeast of B1	Perseus
MHO 582	03 33 20.2	+31 08 02	MH10	–	58, 59	Faint emission in bipolar molecular outflow in B1, possibly counter-flow to MHO 553	Perseus
MHO 583	03 33 27.0	+31 07 10	MH16	HH 790	58, 59	Small knot and diffuse emission near nebulous star in B1	Perseus
MHO 584	03 32 00.6	+30 58 27	–	HH 775	58	Faint arc in B1	Perseus
MHO 585	03 32 27.8	+31 24 39	–	HH 430	58	Faint cone in north-west B1	Perseus
MHO 586	03 32 48.0	+30 57 44	–	HH 786	58	Faint knot south-west of B1	Perseus
MHO 587	03 33 04.9	+31 26 20	–	HH 356	58	Faint knots/bow shocks in northern B1	Perseus
MHO 588	03 33 27.5	+31 07 36	–	HH 789	59	Compact knot coincident with HH emission	Perseus
MHO 589	03 33 33.4	+31 09 44	–	HH 432	58	Small faint knot in B1, possibly associated with MHO 577	Perseus
MHO 590	03 29 12.1	+31 13 00	HL9	–	47	Emission associated with young star in NGC 1333	Perseus
MHO 591	03 28 49.9	+31 14 47	HL1	–	47	Faint wisp of emission in NGC 1333	Perseus
MHO 592	03 29 00.7	+31 16 05	CHH1	–	52	Column of emission ∼1′ west of HH 7-11/MHO 512	Perseus
MHO 593	03 29 10.4	+31 15 10	HL7	–	47, 52	Fainter features downwind of HH 7-11/MHO 512	Perseus
MHO 594	03 29 17.5	+31 14 35	CHH3/4	–	52	Faint, compact features to southeast of MHO 513	Perseus
MHO 595	03 29 04.7	+31 14 25	CHH5	–	52	Faint, collimated jet parallel with (and ∼30″ east of) MHO 515	Perseus
MHO 596	03 47 44.2	+32 52 10	–	–	26	Faint, knotty jet near IRAS 03445+3242	Perseus
MHO 597	03 29 02.5	+31 18 20	–	–	44	Faint arc of emission extending northward from the SVS13/HH 7-11 region	Perseus
MHO 598	03 28 58.6	+31 12 07	CHH12/13	–	52	Faint collimated flow just below MHO 523	Perseus
MHO 599	03 29 16.4	+31 09 51	CHH14	–	52	Faint, compact knot ∼6′ south of the main NGC 1333 cluster	Perseus
MHO 600	03 33 22.1	+31 12 23	MH13	–	59	Object in B1	Perseus
MHO 601	03 33 13.6	+31 06 15	MH14	–	59	Faint bow shock ∼1′ southwest of MHO 554 bipolar nebula in B1	Perseus
MHO 602	03 33 11.5	+31 05 41	MH15	–	59	Faint bow shock in B1, ∼40″ downstream of MHO 601	Perseus
MHO 603	03 33 04.9	+31 13 05	MH17	–	59	A compact (6″ diameter) cluster of knots in B1	Perseus
MHO 604	03 33 07.4	+31 12 58	MH18	–	59	A single compact knot in B1	Perseus
MHO 605	03 43 56.8	+32 00 50	–	HH 211	62, 24, 63, 64, 65, 66	Bright, collimated, bipolar outflow in the IC348 region	Perseus
MHO 606	03 43 56.0	+32 03 54	1a – 1w	–	62, 63, 66	Curving, knotty bipolar flow a few arcmin north of HH 211/MHO 605 in IC348	Perseus
MHO 607	03 43 50.8	+32 03 26	2a – 2h	–	63	Group of knots to west of MHO 606 in the IC348 region	Perseus
MHO 608	03 44 02.6	+32 02 11	3a – 3f	–	63, 66	Small group of knots ∼20″ northeast of IC348 IR	Perseus
MHO 609	03 44 01.8	+31 59 40	4a – 4b	–	63, 66	A few compact features a few arcminutes south of HH 211/MHO 605 in the IC348 region	Perseus
MHO 610	03 44 07.8	+31 56 16	5a – 5d	–	63	Small group of knots/bow shocks ∼5′ southeast of HH 211/MHO 605 and IC348 IR	Perseus
MHO 611	03 43 58.6	+32 01 50	MH1 – 4	–	66	Group of faint knots to W and southwest of IC3448 IR, possibly an extension of MHO 606	Perseus

Table A.3. continued.

Object[a]	RA[a]	Dec[a]	Other ID[b]	HH[c]	References[d]	Comment	Region
MHO 612	03 44 00.9	+32 01 02	MH5	–	66	Faint object ∼1′ south of IC 348 IR, possibly associated with MHO 606 and MHO 611	Perseus
MHO 613	03 44 06.9	+32 01 52	MH6	HH 799	66	Limb-brightened finger of emission to east of IC348 IR	Perseus
MHO 614	03 44 08.7	+31 59 18	MH7	–	66	Compact knot to southeast of IC348 IR	Perseus
MHO 615	03 44 09.0	+32 02 46	MH8/9	–	66	Elongated features extending north and south of nebulous IR source in IC348	Perseus
MHO 616	03 44 09.8	+32 00 06	MH10	–	66	Small faint feature to southeast of IC348 IR	Perseus
MHO 617	03 44 12.4	+32 00 05	MH11	–	66	Compact arc of emission to southeast of IC348 IR	Perseus
MHO 618	03 44 14.0	+32 02 04	MH12	–	66	Small faint knot ∼30″ northeast of nebulous IR source in the IC348 region	Perseus
MHO 619	03 44 18.5	+32 04 14	MH13	–	66	Compact knot to northeast of IC348 IR	Perseus
MHO 620	03 44 21.5	+31 59 41	MH14	–	66	Feature a few arcmin to southeast of the IC348 cluster	Perseus
MHO 621	03 44 42.9	+32 01 35	MH15	HH 841	66	Compact emission associated with HH object and nebulous IR source in IC348	Perseus
MHO 622	03 44 43.1	+32 01 56	MH16 – 18	–	66	Faint filament extending ∼1′ northward from HH 841/MHO 621	Perseus
MHO 623	03 47 41.6	+32 51 45	–	HH 366	67	Complex emission in both lobes of bipolar outflow from B5 IRS1	Perseus
MHO 624	03 47 05.6	+32 43 08	–	HH 367	67	Knots and features extending over ∼1′ south of B5 IRS3	Perseus

Notes. [(a)] Catalogue reference for the Molecular Hydrogen emission-line Object (MHO), with coordinates. [(b)] Other acronyms and labels used in the literature. [(c)] Associated Herbig-Haro object, if any. [(d)] References to papers presenting near-IR images, listed chronologically (including papers citing other IDs); see the full list of references at the end of Table A15.

Table A.4. A list of all known MHOs in Taurus.

Object[a]	RA[a]	Dec[a]	Other ID[b]	HH[a]	References[d]	Comment	Region
MHO 700	04 31 34.0	+18 08 04	[HL]2, HP8	–	68, 23, 69, 38, 70	Compact jets, cusps and emission associated with L1551-IRS5	Taurus
MHO 701	04 31 26.8	+18 07 03	–	HH 260	69, 70	Compact bow shock in large L1551-IRS5 molecular outflow	Taurus
MHO 702	04 31 27.1	+18 06 20	–	HH 29	69, 70	Cluster of bows and knots in centre of large L1551-IRS5 molecular outflow	Taurus
MHO 703	04 31 23.5	+18 08 04	–	–	69, 70	Arc of emission along northwestern edge of L1551-IRS5 molecular outflow	Taurus
MHO 704	04 31 20.1	+18 06 27	–	HH 264	69, 70	Loop and knotty filament along northwestern edge of L1551-IRS5 molecular outflow	Taurus
MHO 705	04 31 18.7	+18 07 34	[HL]1	HH 102	23, 69, 70	Knots and filaments along northwestern edge of L1551-IRS5 molecular outflow	Taurus
MHO 706	04 31 06.0	+18 04 00	–	–	69	Complex of knots and bow shocks towards end of L1551-IRS5 molecular outflow	Taurus
MHO 707	04 31 07.0	+18 03 10	–	HH 28	69	Knots and filaments near end of L1551-IRS5 molecular outflow	Taurus
MHO 708	04 31 30.1	+18 06 12	–	–	69, 70	Small arc/bow shock ∼30″ east of HH 29 in L1551-IRS5 outflow	Taurus
MHO 709	04 31 12.6	+18 06 01	–	–	69, 70	Compact feature along western edge of L1551-IRS5 outflow	Taurus
MHO 710	04 31 44.4	+18 08 31	[HL]3 – 6, HP2 – 6	–	23, 9, 70	Chain of knots associated with L1551-northeast conical nebula	Taurus
MHO 711	04 31 38.7	+18 13 30	–	–	70	Knots and arcs 2–30″ south of HL Tau	Taurus
MHO 712	04 31 36.2	+18 13 27	–	–	70	Faint, collimated jet extending ∼1′ to southwest of HL Tau	Taurus
MHO 713	04 31 23.3	+18 07 02	HP7	–	70	Compact knot in L1551-IRS5 molecular outflow	Taurus
MHO 714	04 31 59.1	+18 12 04	–	HH 262	70	Complex of knots and arcs in L1551	Taurus
MHO 715	04 14 15.0	+28 04 00	–	HH 827	182	Elongated filament in L 1495 (west)	Taurus
MHO 716	04 19 47.7	+27 17 40	–	–	182	Narrow filament in L 1495, possibly associated with IRAS 04166+2706 (and HH 390)	Taurus
MHO 717	04 19 42.6	+27 13 40	–	–	182	Compact knot in blue-shifted lobe of bipolar outflow in L 1495 (MHO 717/718)	Taurus
MHO 718	04 19 34.3	+27 10 48	–	–	182	Faint bow shock in red-shifted lobe of bipolar MHO 717/718 molecular outflow	Taurus

Table A.4. continued.

Object[a]	RA[a]	Dec[a]	Other ID[b]	HH[a]	References[d]	Comment	Region
MHO 719	04 20 54.1	+26 59 55	–	HH 392C	182	Compact knot in red-shifted lobe of bipolar molecular outflow in L 1495 (southeast)	Taurus
MHO 720	05 21 15.8	+27 02 50	–	–	182	Small, flared knot ∼2′ northeast of IRAS 04181+2654 in L 1495	Taurus
MHO 721	05 52 12.8	+26 59 29	[VDR]9 – 1	–	71	Faint emission features near IRAS 05490+2658	Taurus
MHO 722	04 21 59.4	+19 32 06	–	HH 255	72, 73, 74	Arcs around the T Tau system	Taurus
MHO 723	04 27 04.7	+26 06 16	–	HH 158	74	Emission within a few arcsec of TTS DG Tau	Taurus
MHO 724	04 31 38.4	+18 13 58	–	HH 150	74	Cone of emission extending a few arcsec west of TTS HL Tau	Taurus
MHO 725	04 38 32.0	+26 11 00	–	HH 233	74	Compact emission within a few arcsec of TTS HV Tau C	Taurus
MHO 726	04 31 40.0	+18 13 57	–	HH 152	74	Arcs and knots within a few arcsec of TTS XZ Tau	Taurus
MHO 727	05 47 04.3	+20 59 41	–	HH 290	75	Knots in collimated bipolar flow from IR source in CB 34	Taurus
MHO 728	05 47 06.3	+21 00 31	Q1 – Q4	–	75	Chain of knots in collimated flow in CB 34 region	Taurus
MHO 729	05 47 04.2	+21 00 09	–	HH 291	75	Sequence of knots in collimated flow in CB 34	Taurus
MHO 730	04 04 38.7	+26 18 46	–	HH 360A	76, 78	Compact feature to south of IRAS 04016+2610	Taurus
MHO 731	04 19 56.5	+27 09 41	–	HH 391A	76, 182	Knot ∼30″ southwest of nebulous source IRAS 04169+2702	Taurus
MHO 732	04 26 57.2	+24 43 36	–	–	76	Emission extending east from IRAS 04239+2436	Taurus
MHO 733	04 41 12.7	+25 46 44	–	–	7	Arc of emission extending northward from IRAS 04381+2540	Taurus
MHO 734	05 40 24.3	+23 50 56	[VDR]8 – 1, A – L	HH 940	71, 77	Group of faint emission knots associated with IRAS 05373+2349	Taurus
MHO 735	05 40 19.4	+23 52 04	–	–	77	An elongated knot possibly associated with nebulous star	Taurus
MHO 736	05 40 20.9	+23 52 30	–	–	77	A compact knot of unknown origin	Taurus
MHO 737	05 40 22.5	+23 52 24	–	–	77	Faint elongated feature of unknown origin	Taurus
MHO 738	05 40 22.5	+23 50 12	–	–	77	A jet associated with an IRAS 05373+2349	Taurus
MHO 739	05 40 23.4	+23 50 49	–	–	77	An elongated knot associated with an IRAS 05373+2349	Taurus
MHO 740	05 40 24.7	+23 50 30	–	–	77	Two knots emanating from IRAS 05373+2349	Taurus
MHO 741	05 40 26.4	+23 51 32	–	–	77	Two very faint knots to northeast of IRAS 05373+2349	Taurus
MHO 742	05 40 28.1	+23 52 16	–	HH 941	77	A group of bow-like knots	Taurus
MHO 743	05 40 29.9	+23 53 02	–	HH 942	77	A counter bow-shock possibly associated with MHO 742	Taurus

Notes. [(a)] Catalogue reference for the Molecular Hydrogen emission-line Object (MHO), with coordinates. [(b)] Other acronyms and labels used in the literature. [(c)] Associated Herbig-Haro object, if any. [(d)] References to papers presenting near-IR images, listed chronologically (including papers citing other IDs); see the full list of references at the end of Table A15.

Table A.5. A list of all known MHOs in Cygnus.

Object[a]	RA[a]	Dec[a]	Other ID[b]	HH[c]	References[d]	Comment	Region
MHO 800	20 39 19.2	+42 14 53	A1 – 1 : A1 – 3	–	79	Collimated jet in DR21 region	Cygnus
MHO 801	20 39 17.0	+42 16 14	A2 – 1 : A2 – 4	–	79	Compact, bipolar jet from ERO 1 in DR21 region	Cygnus
MHO 802	20 39 01.9	+42 18 11	A3 – 1	–	79	Arc of H₂ emission in DR21 region	Cygnus
MHO 803	20 38 58.9	+42 18 13	A4 – 1 : A4 – 2	–	79	Possible faint jet and bow in DR21 region	Cygnus
MHO 804	20 38 56.4	+42 18 16	A5 – 1 : A5 – 3	–	79	Collimated jet in DR21 region	Cygnus
MHO 805	20 38 41.3	+42 19 01	A6 – 1 : A6 – 2	–	79	Possible bow shock in DR21 region	Cygnus
MHO 806	20 38 46.1	+42 19 14	A7 – 1	–	79	Bright, extended knot in DR21 region	Cygnus
MHO 807	20 38 47.5	+42 19 22	A8 – 1	–	79	Bright, diffuse knot in DR21 region	Cygnus
MHO 808	20 38 50.5	+42 19 09	A9 – 1 : A9 – 3	–	79	Possible collimated jet flowing close to, and parallel with, the main DR21 outflow	Cygnus
MHO 809	20 39 03.7	+42 20 15	A10 – 1	–	79	Collimated jet pointing back toward the DR21 high-mass star forming region	Cygnus
MHO 810	20 38 53.1	+42 20 08	B1 – 1 : B1 – 3	–	79	Jet and bow shock in DR21 region	Cygnus
MHO 811	20 38 55.0	+42 20 39	B2 – 1	–	79	Faint, elongated knot in DR21 region	Cygnus
MHO 812	20 38 59.9	+42 20 51	B3 – 1 : B3 – 2	–	79	Two or more fingers of emission	Cygnus
MHO 813	20 38 58.3	+42 21 09	B4 – 1	–	79	Extended bow or bullet possibly associated with MHO 812	Cygnus
MHO 814	20 39 04.5	+42 22 44	B5 – 1	–	79	Compact knot, possible extension of MHO 815 jet	Cygnus
MHO 815	20 39 00.2	+42 23 02	B6 – 1 : B6 – 3	–	79	Bright, knotty east-west jet in the DR21-OH region	Cygnus
MHO 816	20 38 58.0	+42 22 51	B7 – 1 : B7 – 3	–	79	Curving jet that crosses MHO 815 in the DR21-OH region	Cygnus
MHO 817	20 38 53.4	+42 23 27	B8 – 1	–	79	Pair of faint knots close to MHO 815 in the DR21-OH region	Cygnus
MHO 818	20 39 04.6	+42 26 06	B9 – 1	–	79	Group of bright knots north of DR21-OH	Cygnus
MHO 819	20 39 07.1	+42 26 20	B10 – 1	–	79	Faint, elongated knot just to the north of MHO 818	Cygnus
MHO 820	20 38 45.4	+42 24 58	B11 – 1 : B11 – 2	–	79	Two features that main be part of a collimated jet found to the north-west of DR21-OH	Cygnus
MHO 821	20 38 45.9	+42 24 16	B12 – 1 : B12 – 2	–	79	Bright knot in a fainter jet north-west of DR21-OH	Cygnus
MHO 822	20 38 55.3	+42 21 27	B13 – 1	–	79	Faint, curved knot (bow shock) associated with a nebulous IR source in the DR21 region	Cygnus
MHO 823	20 39 17.3	+42 23 46	B14 – 1 : B14 – 3	–	79	Long chain of three faint knots to the east of DR21-OH	Cygnus
MHO 824	20 39 03.9	+42 24 58	B15 – 1	–	79	Faint, elongated knot to the north of DR21-OH	Cygnus
MHO 825	20 39 09.6	+42 25 24	B16 – 1	–	79	Faint, elongated knot also to the north of DR21-OH	Cygnus
MHO 826	20 38 38.0	+42 38 15	C4 – 1	–	79	Possible elongated jet just to north of the W75N IR nebula	Cygnus
MHO 827	20 38 53.0	+42 37 47	C5 – 1 : C5 – 3	–	79	Faint, curving jet just to the east of the main W75N bipolar outflow	Cygnus
MHO 828	20 38 50.6	+42 39 09	C7 – 1	–	79	Bright, curved knot (bow shock?) to the north of the western lobe of the main W75N outflow	Cygnus
MHO 829	20 38 30.1	+42 39 21	C8 – 1 : C8 – 5	–	79	Collimated knotty jet in the W75N region	Cygnus
MHO 830	20 38 30.7	+42 39 52	C9 – 1 : C9 – 2	–	79	At least two knots in a possible collimated jet in the W75N region	Cygnus
MHO 831	20 38 20.1	+42 39 12	C10 – 1 : C10 – 2	–	79	Two faint knots to north-west of W75N	Cygnus
MHO 832	20 37 47.5	+42 38 37	D1 – 1 : D1 – 8	–	79	Bipolar outflow with bow shocks situated west of W75N	Cygnus
MHO 833	20 38 00.8	+42 40 13	D2 – 1	–	79	Faint arc of emission to west of W75N, may be associated with MHO 834	Cygnus
MHO 834	20 38 00.4	+42 41 32	D3 – 1 : D3 – 2	–	79	Two extended knots or “bullets” in W75N-west which appear to be flowing northward	Cygnus
MHO 835	20 37 48.3	+42 43 42	D4 – 1 : D4 – 6	–	79	Collimated jet to the north-west of W75N	Cygnus
MHO 836	20 38 09.7	+42 38 07	D5 – 1 : D5 – 3	–	79	Faint chain of knots to west of W75N	Cygnus
MHO 837	20 38 05.6	+42 37 42	D6 – 1 : D6 – 3	–	79	Faint chain of knots to west of W75N	Cygnus
MHO 838	20 38 04.8	+42 39 05	D7 – 1 : D7 – 2	–	79	Two faint knots to west of W75N, possible associated with MHO 834	Cygnus
MHO 839	20 38 02.2	+42 39 12	D8 – 1	–	79	Faint arc or bow shock to west of W75N	Cygnus

Table A.5. continued.

Object[a]	RA[a]	Dec[a]	Other ID[b]	HH[c]	References[d]	Comment	Region
MHO 840	20 38 00.6	+42 39 35	D9 – 1	–	79	Faint arc to west of W75N	Cygnus
MHO 841	20 38 03.2	+42 39 49	D10 – 1	–	79	Faint, compact knot in W75N-west	Cygnus
MHO 842	20 37 52.3	+42 40 50	D11 – 1	–	79	Faint knots and filaments in W75N-west	Cygnus
MHO 843	20 37 44.7	+42 40 27	D12 – 1 : D12 – 3	–	79	Faint group of knots (possible jets) in W75N-west	Cygnus
MHO 844	20 36 59.8	+42 11 19	E1 – 1	–	79	Faint knotty jet in L906E	Cygnus
MHO 845	20 37 02.3	+42 11 51	E2 – 1 : E2 – 3	–	79	Possible knotty jet in L906E	Cygnus
MHO 846	20 37 00.1	+42 13 14	E3 – 1 : E3 – 4	–	79	Curving knotty jet in L906E	Cygnus
MHO 847	20 37 21.0	+42 16 03	E4 – 1	–	79	Curving jet/filament in L906E	Cygnus
MHO 848	20 37 28.9	+42 16 12	E5 – 1 : E5 – 6	–	79	Extended, knotty jet in L906E	Cygnus
MHO 849	20 37 19.0	+42 11 39	E6 – 1 : E6 – 2	–	79	Two faint knots in L906E	Cygnus
MHO 850	20 37 14.5	+42 13 01	E7 – 1	–	79	Faint bow shock in L906E	Cygnus
MHO 851	20 37 05.2	+42 13 14	E8 – 1	–	79	Faint knot (part of MHO 846?) in L906E	Cygnus
MHO 852	20 37 32.0	+42 14 27	E9 – 1	–	79	Faint north-south filament in L906E	Cygnus
MHO 853	20 38 50.7	+42 24 08	B17 – 1	–	79	Small, faint knot in DR21 region	Cygnus
MHO 854	20 38 26.4	+42 36 46	C1 – 1 : C1 – 5	–	80, 79, 81	Large bow shock in south-western lobe of main W75N bipolar outflow	Cygnus
MHO 855	20 38 42.3	+42 37 42	C2 – 1 : C2 – 2	–	81, 79	Filament in northeastern lobe of main W75N bipolar flow	Cygnus
MHO 856	20 38 38.5	+42 38 00	C3 – 1 : C3 – 3	–	80, 79, 81	Bright arc in W75N nebula	Cygnus
MHO 857	20 38 51.3	+42 38 39	C6 – 1 : C6 – 2	–	80, 79, 81	Conical bow shock in northeastern lobe of main W75N bipolar flow	Cygnus
MHO 858	20 08 10.5	+35 59 30	[VDR]35 – 1	–	71	northeastern outflow lobe from IRAS 20062+3550	Cygnus
MHO 859	20 08 09.5	+35 59 13	[VDR]35 – 2	–	71	Feature probably associated with southwestern flow lobe from IRAS 20062+3550	Cygnus
MHO 860	20 14 25.8	+41 13 34	[VDR]36 – 1	–	82, 83, 84, 71	Collimated bipolar flow from IRAS 20126+4104	Cygnus
MHO 861	20 14 24.8	+41 13 53	[VDR]36 – 2	–	71	Faint feature ~30″ northwest of IRAS 20126+4104	Cygnus
MHO 862	20 14 27.9	+41 12 55	[VDR]36 – 3/36 – 4	–	71	Bipolar outflow situated ~40″ southeast of IRAS 20126+4104	Cygnus
MHO 863	20 20 41.5	+39 38 32	[VDR]37 – 1	–	71	Faint object ~45″ northwest of IRAS 20188+3928	Cygnus
MHO 864	20 20 39.6	+39 38 16	[VDR]37 – 2	–	71	Faint emission ~30″ north of IRAS 20188+3928	Cygnus
MHO 865	20 20 39.0	+39 38 09	[VDR]37 – 3	–	71	Faint emission ~30″ north of IRAS 20188+3928	Cygnus
MHO 866	20 20 39.0	+39 38 16	[VDR]37 – 4	–	71	Faint emission ~30″ north of IRAS 20188+3928	Cygnus
MHO 867	20 20 38.9	+39 37 51	[VDR]37 – 5	–	71	Faint, nebulous emission next to IRAS 20188+3928	Cygnus
MHO 868	20 21 39.3	+37 25 24	[VDR]38 – 1	–	71	Elongated knots ~30″ southwest of IRAS 20198+3716	Cygnus
MHO 869	20 21 42.5	+37 25 35	[VDR]38 – 2	–	71	Fingers or “bullets” extending east of nebulosity (in IRAS 20198+3716 region)	Cygnus
MHO 870	20 24 29.3	+42 03 57	[VDR]39 – 1	–	71	Bow shock ~30″ southwest of IRAS 20227+4154	Cygnus
MHO 871	20 24 33.0	+42 04 09	[VDR]39 – 2	–	71	Elongated knot ~15″ southeast of IRAS 20227+4154 (assoc. with MHO 872?)	Cygnus
MHO 872	20 24 30.3	+42 04 32	[VDR]39 – 3	–	71	Faint emission ~15″ northwest of IRAS 20227+4154 (assoc. with MHO 871?)	Cygnus
MHO 873	20 24 27.9	+42 04 38	[VDR]39 – 4	–	71	Diffuse emission ~45″ northwest of IRAS 20227+4154	Cygnus
MHO 874	20 24 33.7	+42 04 20	[VDR]39 – 5	–	71	Faint emission ~20″ east of IRAS 20227+4154	Cygnus
MHO 875	20 30 27.2	+41 16 11	[VDR]40 – 1	–	71	Compact features ~30″ north of IRAS 20286+4105	Cygnus
MHO 876	20 31 12.2	+40 03 09	[VDR]41 – 1	–	85, 71	Small knots ~15″ east of IRAS 20293+3952	Cygnus

Table A.5. continued.

Object[a]	RA[a]	Dec[a]	Other ID[b]	HH[c]	References[d]	Comment	Region
MHO 877	20 31 12.9	+40 03 23	[VDR]41 – 2	–	85, 71	Features ∼30″ northeast of IRAS 20293+3952	Cygnus
MHO 878	20 31 12.3	+40 03 24	[VDR]41 – 3	–	85, 71	Features ∼30″ northeast of IRAS 20293+3952	Cygnus
MHO 879	20 31 13.9	+40 03 29	[VDR]41 – 4	–	85, 71	Complex features ∼45″ northeast of IRAS 20293+3952	Cygnus
MHO 880	20 31 14.6	+40 03 23	[VDR]41 – 5	–	85, 71	Complex features ∼45″ east of IRAS 20293+3952	Cygnus
MHO 881	20 31 13.6	+40 03 12	[VDR]41 – 6	–	85, 71	Small knots ∼30″ east of IRAS 20293+3952	Cygnus
MHO 882	21 32 30.5	+51 02 16	[VDR]44 – 1	–	71	Faint features associated with nebulosity just to southwest of IRAS 21307+5049	Cygnus
MHO 883	20 25 12.7	+34 50 21	[JYY]1	–	86	Two knots ∼1′ east of IRAS 20231+3440	Cygnus
MHO 884	20 25 08.0	+34 50 39	[JYY]2, 3	–	86	Faint emission in northern, blue lobe of outflow from IRAS 20231+3440	Cygnus
MHO 885	20 25 06.6	+34 50 14	[JYY]4	–	86	Nebulous emission associated with IRAS 20231+3440	Cygnus
MHO 886	20 25 06.8	+34 50 03	[JYY]5, 6	–	86	Faint knots close to IRAS 20231+3440	Cygnus
MHO 887	20 25 07.4	+34 49 54	[JYY]7	–	86	Faint arc near IRAS 20231+3440	Cygnus
MHO 888	20 25 07.5	+34 49 08	[JYY]8	–	86	Compact emission feature ∼1′ south of IRAS 20231+3440	Cygnus
MHO 897	20 46 08.7	+46 40 41	[VDR]42 – A/B	–	71	Faint emission around IRAS 20444+4629	Cygnus
MHO 898	20 39 07.8	+42 19 56	–	–	27, 87, 79, 88	northeastern lobe of main DR21 bipolar outflow	Cygnus
MHO 899	20 38 55.3	+42 19 15	–	–	27, 87, 79, 88	South-western lobe of main DR21 bipolar outflow (MHO 898/899)	Cygnus
MHO 900	20 58 07.7	+52 48 59	–	–	89	Faint shock fronts resembling “the butterfly” structure	Cygnus
MHO 901	20 58 22.4	+52 27 54	–	HH 382	89	A group of faint knots. H2 view of the HH 382 outflow (knots E,F,G).	Cygnus
MHO 902	20 58 25.2	+52 18 10	–	HH 382	89	A group of shocks coinciding with HH 382 (knots D).	Cygnus
MHO 903	20 58 45.5	+52 22 48	–	–	89	A large diffuse knot possibly originating from IRAS20575+5210	Cygnus
MHO 904	20 58 49.9	+52 06 17	–	–	89	Two very faint knots of unknown origin	Cygnus
MHO 905	20 58 56.1	+52 30 41	–	–	89	A faint bow shock	Cygnus
MHO 906	20 59 02.6	+52 35 45	–	HH 380	89	A chain of diffuse knots possibly originating from HH 381 IRS (knots F,D,C).	Cygnus
MHO 907	20 59 06.7	+52 29 52	–	HH 970	89	A complex bow shock – a counter lobe of MHO 910	Cygnus
MHO 908	20 59 07.8	+52 22 31	–	HH 974	89	A chain of bow-shocks from IRAS 20575+5210	Cygnus
MHO 909	20 59 09.5	+52 33 27	–	–	89	Intermediate knots in the flow MHO 907 – MHO 910	Cygnus
MHO 910	20 59 11.9	+52 34 12	–	HH 380	89	Counter bow of MHO 907 with faint sub-knots	Cygnus
MHO 911	20 59 46.3	+52 33 09	–	HH 627	89	Bow-shock from an unknown origin	Cygnus
MHO 912	20 59 51.3	+52 16 29	–	–	89	A complex bow-shock structure possibly originating from Cyg19 source, southwest lobe of MHO 922	Cygnus
MHO 913	20 59 51.8	+52 40 20	–	HH 975	89	A two lobe outflow from IRAS 20583+5228	Cygnus
MHO 914	21 00 08.6	+52 25 54	–	–	89	Pair of diffuse knots possibly originating from IRAS 20588+5211	Cygnus
MHO 915	21 00 09.6	+52 18 16	–	–	89	Intermediate knots of MHO 912-922 flow around Cyg19 Hα star	Cygnus
MHO 916	21 00 10.9	+52 29 01	–	HH 629	89	Knots possibly originating from Braid Nebula star. H2 view of the HH 629 outflow (knots A,B).	Cygnus
MHO 917	21 00 12.1	+52 27 15	–	–	89	Very compact bow-shock possibly from IRAS 20588+5211	Cygnus
MHO 918	21 00 12.1	+52 22 42	–	–	89	Very faint diffuse blob of unknown origin	Cygnus
MHO 919	21 00 18.2	+52 28 07	NIR1	–	90, 89	Two bow-like compact knots possibly connected with IRAS 20588+5211	Cygnus
MHO 920	21 00 18.5	+52 25 55	NIR2	–	90, 89	Several bow-like knots in the vicinity of IRAS 20588+5211	Cygnus
MHO 921	21 00 22.8	+52 26 22	NIR3	–	90, 89	Bow-shock possibly originating from IRAS 20588+5211	Cygnus
MHO 922	21 00 35.2	+52 21 06	–	–	89	A complex bow-shock structure, counter lobe of MHO 912	Cygnus

Table A.5. continued.

Object[a]	RA[a]	Dec[a]	Other ID[b]	HH[c]	References[d]	Comment	Region
MHO 923	21 00 37.6	+52 29 23	–	HH 448	90, 89	A complex structure of several bow-shocks	Cygnus
MHO 924	21 00 42.5	+52 31 43	–	HH 635	90, 89	A compact bow shock possibly from Braid Nebula	Cygnus
MHO 925	21 00 42.7	+52 25 11	–	HH 633	89	Knot associated with IRAS 20591+5214	Cygnus
MHO 926	21 00 43.9	+52 27 37	–	HH 634	90, 89	H2 view of the HH634 outflow (knots A,B,C,D).	Cygnus
MHO 927	21 00 52.0	+52 33 27	–	HH 635	89	Faint knots possibly connected with Braid Nebula, H2 view of HH 635 (knots B,C,D).	Cygnus
MHO 928	21 01 58.8	+52 29 37	–	–	89	A diffuse knot in the vicinity of IRAS 21005+5217	Cygnus
MHO 929	21 01 59.3	+52 28 56	–	–	89	Two faint knots possibly originating from IRAS 21005+5217	Cygnus
MHO 930	21 02 02.3	+52 28 44	–	–	89	Two faint knots possibly part of an outflow from IRAS 21005+5217	Cygnus
MHO 931	21 02 02.8	+52 19 24	–	–	89	Faint and diffuse knots of unknown origin	Cygnus
MHO 932	21 02 03.3	+52 20 11	–	–	89	Group of knots originating from a flow coming from southwest	Cygnus
MHO 933	21 02 09.9	+52 28 17	–	–	89	Two knots, possibly part of flow from IRAS 21005+5217	Cygnus
MHO 934	21 02 10.7	+52 35 57	–	–	89	A faint but large bow shock of unknown origin	Cygnus
MHO 935	21 02 11.8	+52 30 38	–	–	89	Two Northeast knots possibly a counter lobs of flow from IRAS 21005+5217 and MHO 930	Cygnus
MHO 936	21 02 21.7	+52 26 09	–	–	89	Group of diffuse knots, possibly assoc. with MHO 933	Cygnus
MHO 945	20 10 10.3	+31 31 23	–	–	85	Chain of knots to the southeast of IRAS 20081+3132	Cygnus
MHO 946	20 10 07.0	+31 31 40	–	–	85	Complex group of knots and features ~20–30″ west of IRAS 20081+3132	Cygnus
MHO 947	20 36 08.4	+41 39 55	a	–	85	Elongated feature extending to southeast from IRAS 20343+4129 (next to MHO 948)	Cygnus
MHO 948	20 36 06.7	+41 39 55	b	–	85	Emission extending to southwest in IRAS 20343+4129 region (very close to MHO 947)	Cygnus
MHO 950	21 35 10.0	+50 53 30	–	–	91	Extensive emission in northeastern lobe of MHO 950/951 flow from IRAS 21334+5039	Cygnus
MHO 951	21 35 07.7	+50 52 30	–	–	91	Emission features in southwestern MHO 950/951 flow lobe from IRAS 21334+5039	Cygnus
MHO 952	20 29 24.9	+40 11 20	B, C, D	–	92	Features in western lobe of outflow from AFGL 2591 IR	Cygnus
MHO 953	20 29 27.0	+40 11 30	A	–	92	Emission in eastern lobe of outflow from AFGL 2591 IR	Cygnus

Notes. [(a)] Catalogue reference for the Molecular Hydrogen emission-line Object (MHO), with coordinates. [(b)] Other acronyms and labels used in the literature. [(c)] Associated Herbig-Haro object, if any. [(d)] References to papers presenting near-IR images, listed chronologically (including papers citing other IDs); see the full list of references at the end of Table A15.

Table A.6. A list of all known MHOs in Auriga.

Object[a]	RA[a]	Dec[a]	Other ID[b]	HH[c]	References[d]	Comment	Region
MHO 1000	05 01 39.0	+47 07 27	[VDR]2 – 1/2 – 2	–	71	Emission in northwest lobe of bipolar outflow from IRAS 04579+4703	Auriga
MHO 1001	05 01 41.6	+47 07 10	[VDR]2 – 3/2 – 4	–	71	Emission in southeast lobe of bipolar outflow from IRAS 04579+4703	Auriga
MHO 1002	05 17 14.3	+39 22 41	[VDR]3 – 1a	–	71	Bright bow-shocks ∼30″ northeast of IRAS 05137+3919	Auriga
MHO 1003	05 17 13.5	+39 21 51	[VDR]3 – 1b	–	71	Nested bow-shocks ∼20″ south of IRAS 05137+3919	Auriga
MHO 1004	05 17 13.8	+39 22 15	[VDR]3 – 2	–	71	Collimated bipolar flow near IRAS 05137+3919	Auriga
MHO 1005	05 30 49.5	+33 48 14	[VDR]5 – 1	–	71	Faint, elongated feature ∼1′ northeast of IRAS 05274+3345	Auriga
MHO 1006	05 30 45.6	+33 47 55	[VDR]5 – 2	–	71	Diffuse feature close to IRAS 05274+3345	Auriga
MHO 1007	05 30 47.1	+33 47 57	[VDR]5 – 3	–	71	Knots in complex region near IRAS 05274+3345	Auriga
MHO 1008	05 30 47.5	+33 47 57	[VDR]5 – 4	–	71	Knots in complex region near IRAS 05274+3345	Auriga
MHO 1009	05 30 47.9	+33 47 49	[VDR]5 – 5	–	71	Knots in complex region near IRAS 05274+3345	Auriga
MHO 1010	05 30 48.3	+33 47 57	[VDR]5 – 6	–	71	Knots in complex region near IRAS 05274+3345	Auriga
MHO 1011	05 30 48.3	+33 48 25	[VDR]5 – 7	–	71	Compact feature ∼40″ northeast of IRAS 05274+3345	Auriga
MHO 1012	05 37 51.9	+32 00 24	[VDR]6 – 8/6 – 9	–	93, 94, 71	Features in northeastern outflow lobe from nebulous IR source (near IRAS 05345+3157)	Auriga
MHO 1013	05 37 50.3	+32 00 12	[VDR]6 – 1	–	93, 94, 71	Faint object in northeastern outflow lobe from nebulous IR source (near IRAS 05345+3157)	Auriga
MHO 1014	05 37 51.1	+32 00 07	[VDR]6 – II	–	93, 94, 71	Faint object in northeastern outflow lobe from nebulous IR source (near IRAS 05345+3157)	Auriga
MHO 1015	05 37 51.1	+32 59 56	[VDR]6 – 10	–	93, 94, 71	Faint object in northeastern outflow lobe from nebulous IR source (near IRAS 05345+3157)	Auriga
MHO 1016	05 37 52.0	+31 59 28	[VDR]6 – 1	–	93, 94, 71	Faint knots ∼30″ southeast of IR source (near IRAS 05345+3157); MHO 1018 counter-flow?	Auriga
MHO 1017	05 37 49.3	+31 59 42	[VDR]6 – 6	–	93, 94, 71	Small object in southwestern outflow lobe from nebulous IR source (near IRAS 05345+3157)	Auriga
MHO 1018	05 37 48.7	+32 00 01	[VDR]6 – 2/6 – 3/ 6 – 4	–	93, 94, 71	Faint knots extending northwest of IR source (near IRAS 05345+3157); MHO 1016 counter-flow?	Auriga
MHO 1019	05 37 45.6	+31 58 59	[VDR]6 – 5	–	93, 94, 71	Faint object at end of southwestern flow lobe from nebulous IR source (near IRAS 05345+3157)	Auriga
MHO 1021	05 39 15.6	+35 42 13	–	–	181	Faint knot in symmetric flow ∼4′ south of IRAS 05358+3543	Auriga
MHO 1022	05 39 06.0	+35 47 10	flow 11	–	181	Chain of knots ∼2′ NNW of IRAS 05358+3543	Auriga
MHO 1023	05 39 12.0	+35 45 47	[VDR]7 – 4	–	71, 181	Faint object northeast of IRAS 05358+3543 - associated with MHO 1024?	Auriga
MHO 1024	05 39 11.8	+35 45 24	[VDR]7 – 5	–	71, 181	Faint object northeast of IRAS 05358+3543 - associated with MHO 1023?	Auriga
MHO 1025	05 39 16.6	+35 48 05	flow 4n	HH 994	181	Chain of knots terminating in bow to north of S223	Auriga
MHO 1026	05 39 05.8	+35 48 25	flow 6n	–	181	Faint knots/bows to NNW of IRAS 05358+3543/S223	Auriga
MHO 1027	05 39 09.4	+35 46 08	N3F, flow 6s	–	97, 181	Faint bow shock near S223; counter-flow to MHO 1050 or MHO 1026	Auriga
MHO 1028	05 39 09.2	+35 44 25	[VDR]7 – 9	–	71, 181	Faint feature ∼50″ south of IRAS 05358+3543	Auriga
MHO 1029	05 39 26.7	+35 40 45	$A1_1, A1_2$	–	95	Two compact knots in G173.58+2.45 (IRAS 05361+3539), in counter-lobe to MHO 1033	Auriga
MHO 1030	05 39 26.2	+35 40 32	$A2_1, A2_2$	–	95	Knots further downwind of MHO 1029 in G173.58+2.45 (IRAS 05361+3539)	Auriga
MHO 1031	05 39 25.7	+35 40 34	$A3_1 - A3_4$	–	95	Knots and diffuse emission in the G173.58+2.45 (IRAS 05361+3539) region	Auriga
MHO 1032	05 39 26.1	+35 40 42	$A4_1, A4_2$	–	95	Two compact knots in the G173.58+2.45 (IRAS 05361+3539) region	Auriga
MHO 1033	05 39 27.8	+35 41 16	B2, B3	–	95	Northward-facing bow shocks in the G173.58+2.45 region (nr. IRAS 05361+3539)	Auriga
MHO 1034	05 39 26.5	+35 41 18	B4	–	95	Compact feature in the G173.58+2.45 (IRAS 05361+3539) region	Auriga
MHO 1035	05 39 25.4	+35 40 53	B5	–	95	Compact feature in the G173.58+2.45 (IRAS 05361+3539) region	Auriga
MHO 1036	05 39 26.4	+35 41 00	B1, C1 – C4	–	95	Chain of knots in G173.58+2.45/IRAS 05361+3539	Auriga
MHO 1037	05 39 28.9	+35 40 45	D	–	95	Arc of emission assoc. with stars 76 and 78 in the G173.58+2.45 (IRAS 05361+3539) region	Auriga
MHO 1038	05 39 24.0	+35 41 19	E	–	95	Compact feature northwest of G173.58+2.45 (IRAS 05361+3539)	Auriga
MHO 1039	05 39 30.0	+35 41 10	–	–	95	Arc of emission near IR source to northeast of G173.58+2.45 (IRAS 05361+3539)	Auriga
MHO 1040	05 39 27.7	+35 40 29	–	–	95	Bow shock from star 65 in the G173.58+2.45 (IRAS 05361+3539) region	Auriga

Table A.6. continued.

Object[a]	RA[a]	Dec[a]	Other ID[b]	HH[c]	References[d]	Comment	Region
MHO 1041	05 39 11.9	+35 46 42	N1, N2	HH 993	96, 97, 181	Northward-facing bows in S233 (IRAS 05358+3543), counter-flow to MHO 1046	Auriga
MHO 1042	05 39 10.4	+35 46 19	N3, [VDR]7 – 2	–	96, 97, 71, 85, 181	Chain of bows extending to northwest in the S233 (IRAS 05358+3543) region	Auriga
MHO 1043	05 39 10.8	+35 46 04	N3, [VDR]7 – 3	–	96, 97, 71, 85, 181	Knots and filaments near MHO 1042 in the S233 (IRAS 05358+3543) region	Auriga
MHO 1044	05 39 14.1	+35 46 46	N4, [VDR]7 – 1	–	96, 97, 71, 85, 181	Emission assoc. with nebulous IR source in S233 (IRAS 05358+3543) region	Auriga
MHO 1045	05 39 10.0	+35 45 17	N5, [VDR]7 – 7	–	96, 97, 71, 85, 181	Emission north and south of IRAS 05358+3543 in S233	Auriga
MHO 1046	05 39 14.1	+35 44 35	N6, [VDR]7 – 6	–	96, 97, 71, 85, 181	Southward-facing bows in S233 (IRAS 05358+3543), counter-flow to MHO 1041	Auriga
MHO 1047	05 39 11.8	+35 44 30	N7	–	97, 71, 85, 181	Faint knot to southeast of IRAS 05358+3543, counter-flow to MHO 1048?	Auriga
MHO 1048	05 39 08.1	+35 45 58	N9, [VDR]7 – 8	–	97, 71, 85, 181	Faint filament to northwest of IRAS 05358+3543, counter-flow to MHO 1047?	Auriga
MHO 1049	05 39 09.3	+35 46 57	N11	–	97, 181	Very faint filament in northern S233 (IRAS 05358+3543) region	Auriga
MHO 1050	05 39 07.9	+35 47 01	N12	–	97, 181	Faint knots to the north of S233 (IRAS 05358+3543)	Auriga
MHO 1051	04 36 41.7	+54 39 52	–	–	26	Group of faint, diffuse knots and filaments near IRAS 04327+5432	Auriga
MHO 1052	05 39 27.0	+35 40 51	No.8	–	98	Chain of faint knots in IRAS 05361+3539 region	Auriga
MHO 1053	05 07 49.6	+30 24 05	–	HH 229	74	Emission within a few arcsec of TTS RW Aur	Auriga

Notes. [(a)] Catalogue reference for the Molecular Hydrogen emission-line Object (MHO), with coordinates. [(b)] Other acronyms and labels used in the literature. [(c)] Associated Herbig-Haro object, if any. [(c)] Associated Herbig-Haro object, if any. [(d)] References to papers presenting near-IR images, listed chronologically (including papers citing other IDs); see the full list of references at the end of Table A15.

Table A.7. A list of all known MHOs in Gemini.

Object[a]	RA[a]	Dec[a]	Other ID[b]	HH[c]	References[d]	Comment	Region
MHO 1200	05 58 13.9	+16 31 57	[VDR]10 – 1/10 – 2/10 – 3	–	99, 71	Bipolar flow from IRAS 05553+1631	Gemini
MHO 1201	06 09 05.3	+21 50 54	[VDR]11 – 1	–	100, 71	Bow shock in northwestern lobe of bipolar flow from IRAS 06061+2151	Gemini
MHO 1202	06 09 08.5	+21 50 22	[VDR]11 – 2	–	100, 71	Faint object in southeastern lobe of bipolar flow from IRAS 06061+2151	Gemini
MHO 1203	06 09 08.6	+21 50 31	[VDR]11 – 3	–	71	Compact feature; part of the MHO 1201/1202 bipolar flow from IRAS 06061+2151?	Gemini
MHO 1204	06 08 52.9	+21 38 38	N	–	80	Bright, elongated feature ∼10″ east of AFGL 5180 IRS1	Gemini
MHO 1205	06 08 53.8	+21 38 15	A – D	–	80	Chain of knots extending east-west in the AFGL 5180 cluster	Gemini
MHO 1206	06 08 55.0	+21 37 50	S1, S2	–	80	Group of at least two knots ∼40″ south of AFGL 5180 IRS1	Gemini
MHO 1207	06 08 54.1	+21 36 25	–	–	80	V-shaped feature ∼2′ south of AFGL 5180	Gemini
MHO 1208	06 09 02.9	+21 38 48	A – G	–	80	Collimated, knotty jet ∼2′ east of the main AFGL 5180 cluster	Gemini
MHO 1209	06 12 50.9	+17 59 06	H21	–	101	Elongated knot in the centre of the S255 IR complex	Gemini
MHO 1210	06 12 49.3	+17 58 11	H22	–	101	Compact knot ∼1.5′ southwest of S255 IR	Gemini
MHO 1211	06 12 53.4	+18 00 26	H23/4	–	101	Two knots either side of a G192.58-00.4 UCHII, ∼1.5′ north of S255 IR	Gemini
MHO 1212	06 12 52.3	+17 59 55	H25	–	101	Faint, compact feature ∼40″ northwest of S255 IR	Gemini
MHO 1213	06 12 51.9	+17 58 42	H26	–	101	Compact knot ∼1′ southwest of S255 IR	Gemini
MHO 1214	06 12 56.7	+17 58 16	H27	–	101	Knot and filament ∼1.5′ to southeast of main S255 IR complex	Gemini
MHO 1215	06 12 55.2	+17 59 32	H28	–	101	Collimated jet in S255 IR complex, probable MHO 1209 counter-flow	Gemini

Notes. [(a)] Catalogue reference for the Molecular Hydrogen emission-line Object (MHO), with coordinates. [(b)] Other acronyms and labels used in the literature. [(c)] Associated Herbig-Haro object, if any. [(a)] References to papers presenting near-IR images, listed chronologically (including papers citing other IDs); see the full list of references at the end of Table A15.

Table A.8. A list of all known MHOs in Monoceros.

Object[a]	RA[a]	Dec[a]	Other ID[b]	HH[c]	References[d]	Comment	Region
MHO 1300	06 07 10.4	–06 26 34	HOD071	–	102	Curving, collimated jet ∼5′ southwest of the main Mon R2 star forming region	Monoceros
MHO 1301	06 07 30.5	–06 11 51	HOD072	–	102	Two knots of emission ∼10′ north of Mon R2	Monoceros
MHO 1302	06 07 31.6	–06 12 47	HOD073	–	102	Small bow shock ∼10′ north of Mon R2, possibly assoc. with MHO 1301	Monoceros
MHO 1303	06 07 37.6	–06 19 54	HOD074	–	102	Two knots of emission in the Mon R2 region	Monoceros
MHO 1304	06 07 38.7	–06 21 14	HOD075	–	102	Faint, extended emission feature	Monoceros
MHO 1305	06 07 41.2	–06 11 14	HOD076	–	102	Chain of 4–5 knots ∼3′ north of the Mon R2 region	Monoceros
MHO 1306	06 07 41.5	–06 21 28	HOD077	–	102	Two bright knots plus fainter filaments either side of a faint star in Mon R2	Monoceros
MHO 1307	06 07 43.7	–06 10 46	HOD078	–	102	Small jet of extended emission ∼3′ north of Mon R2	Monoceros
MHO 1308	06 07 44.0	–06 11 02	HOD079	–	102	Bow shock near MHO 1307, ∼3′ north of Mon R2	Monoceros
MHO 1309	06 07 44.1	–06 23 59	HOD0710	–	102	Jet and bow shock in the Mon R2 region	Monoceros
MHO 1310	06 07 46.8	–06 20 12	HOD0711	–	102	Faint bow shock in the Mon R2 region	Monoceros
MHO 1311	06 07 49.8	–06 20 43	HOD0712	–	102	Emission associated with a faint bipolar nebula in Mon R2	Monoceros
MHO 1312	06 07 54.0	–06 27 30	HOD0713(3N/4N)	–	102	Bow shocks oat the northern end of the extensive MHO 1312-1316 outflow in south-Mon R2	Monoceros
MHO 1313	06 07 56.0	–06 29 30	HOD0713(1N/2N)	–	102	Knots and bow shocks in MHO 1312-1316	Monoceros
MHO 1314	06 07 57.5	–06 31 05	HOD0713(1B)	–	102	Knots in the centre of the MHO 1312-1316 outflow in south-Mon R2	Monoceros
MHO 1315	06 07 58.0	–06 32 30	HOD0713(1S/2S)	–	102	Knots and filaments in the MHO 1312-1316 outflow	Monoceros
MHO 1316	06 08 01.0	-06 34 45	HOD0713(3S/4S)	–	102	Knots at the southern end of the extensive MHO 1312-1316 outflow in south-Mon R2	Monoceros
MHO 1317	06 07 58.9	–06 25 31	HOD0714	–	102	Compact bipolar jet ∼5′ southeast of the Mon R2 region	Monoceros
MHO 1318	06 08 10.0	–06 24 47	HOD0715	–	102	Curving chain of knots ∼5′ east of the Mon R2 region	Monoceros
MHO 1319	06 07 07.9	–06 03 42	–	HH 866W	102	Group of knots extended north-south, ∼20″ west of MHO 1320 in L 1646 (IRAS06046-0603)	Monoceros
MHO 1320	06 07 09.8	–06 03 44	–	HH 866E	102	Poorly-defined bow shock ∼20″ east of MHO 1319 in L 1646 (IRAS06046-0603)	Monoceros
MHO 1321	06 35 26.9	+03 56 22	–	–	180	Multiple knots and bow shocks in a major flow in the Rosette region	Monoceros
MHO 1322	06 10 50.2	–06 11 55	–	–	103	Array of knots associated with GGD 12-15/IRAS 06084-0611	Monoceros
MHO 1323	06 41 07.5	+10 16 20	C(North)	–	104	Knotty bows ∼1.5′ northwest of IRAS 06382+1017 in core BRC25 (counter-flow to MHO 1328?)	Monoceros
MHO 1324	06 41 02.5	+10 15 40	B	–	104	Bow shock/flow lobe extending northward from IRAS 06382+1017 in BRC25 cloud core	Monoceros
MHO 1325	06 40 59.5	+10 15 20	A(West)	HH 124	105, 104	Knots in western lobe of bipolar outflow from IRAS 06382+1017 (counter-lobe to MHO 1326)	Monoceros
MHO 1326	06 41 05.7	+10 14 55	A(East)	HH 124	105, 104	Bow shocks in eastern lobe of bipolar flow from IRAS 06382+1017 (counter-lobe to MHO 1325)	Monoceros
MHO 1327	06 41 05.3	+10 14 25	D	–	104	Outflow lobe extending to southeast in BRC 25 cloud core	Monoceros
MHO 1328	06 41 01.9	+10 14 05	C(South)	–	104	Collimated flow extending southward in BRC 25 cloud core counter-flow to MHO 1323?)	Monoceros
MHO 1329	06 07 06.4	–11 16 58	–	HH 999	106	Northern lobe of spectacular MHO 1329/1330 bipolar outflow from IRAS 06047-1147	Monoceros
MHO 1330	06 07 10.1	–11 18 49	–	HH 999	106	Southern lobe of spectacular MHO 1329/1330 bipolar outflow IRAS 06047-1147	Monoceros
MHO 1331	06 14 37.7	+13 49 30	[JYY]1 – 5	HH 191	107	Emission knots and filaments associated with S269	Monoceros
MHO 1332	06 14 34.3	+13 49 10	[JYY]6	–	107	Compact feature in southwest corner of S269 cluster	Monoceros
MHO 1333	06 34 37.2	+04 13 15	AS1	–	108	Large bow ∼30″ north of AFGL 961	Monoceros
MHO 1334	06 34 35.5	+04 12 46	AS2	–	108, 109	Bows north and south of massive YSO ∼20″ east of AFGL 961 (Rosette eye)	Monoceros
MHO 1335	06 34 37.3	+04 12 23	AS3	–	108	Two bows ∼20″ south of AFGL 961	Monoceros

Table A.8. continued.

Object[a]	RA[a]	Dec[a]	Other ID[b]	HH[c]	References[d]	Comment	Region
MHO 1336	06 34 36.4	+04 11 39	AS4	–	108	Elongated knot ∼1′ south of the Rosette eye in the AFGL 961 region	Monoceros
MHO 1337	06 34 35.9	+04 12 07	AS5	–	108	Diffuse knots midway between MHO 1334/1336 in the AFGL 961 cluster	Monoceros
MHO 1338	06 34 41.5	+04 14 11	AS6	–	108	Diffuse emission arcs ∼1.5′ northeast of AFGL 961	Monoceros
MHO 1339	06 34 39.4	+04 13 26	AS7	–	108	Faint bow shock ∼1′ northeast of AFGL 961	Monoceros
MHO 1340	06 34 38.3	+04 13 15	AS8	–	108	Multiple, overlapping bow shocks ∼40″ northeast of AFGL 961	Monoceros
MHO 1341	06 34 31.5	+04 13 25	AS9	–	108	Narrow bow shock ∼1.5′ northwest of AFGL 961	Monoceros
MHO 1342	06 34 36.1	+04 12 32	–	–	128	Knot and emission ∼20″ south of the Rosette eye	Monoceros
MHO 1343	06 34 37.2	+04 13 45	–	–	128	Large diffuse bow downwind of MHO 1333	Monoceros
MHO 1344	06 34 40.3	+04 13 45	–	–	128	Faint emission between MHO 1338 and 1339 in the AFGL 961 region	Monoceros
MHO 1345	06 34 44.5	+04 14 26	–	–	128	Faint bow shocks downwind of MHO 1338 (northeast of AFGL 961)	Monoceros
MHO 1346	06 34 36.2	+04 13 25	–	–	128	Curving, knotty filament extending northward from the AFGL 961 cluster	Monoceros
MHO 1347	06 34 33.5	+04 11 30	–	–	128	Compact knot/bow shock to southwest of AFGL 961	Monoceros
MHO 1348	06 34 30.0	+04 11 15	–	–	128	Faint, westward-facing bowshock to southwest of AFGL 961	Monoceros
MHO 1349	06 41 10.5	+09 29 47	A, B	–	110	Emission associated with NGC 2264 IRS1	Monoceros
MHO 1350	06 41 09.9	+09 28 14	C, D	–	110, 111	Knotty jet extending to south of NGC 2264 IRS1 nebula/eclipsing T Tauri star KH 15D	Monoceros
MHO 1351	06 41 12.2	+09 29 50	E, F	–	110	Arc in NGC 2264 IRS1 region, possibly assoc. with MHO 1350	Monoceros
MHO 1352	06 41 15.3	+09 29 44	G1 – G3, H1 – H3	–	110	Collimated jet ∼1–2′ east-southeast of NGC 2264 IRS1	Monoceros
MHO 1353	06 41 17.9	+09 30 08	I, J, K	–	110	Chain of knots in the NGC 2264 IRS1 region	Monoceros
MHO 1354	06 41 15.3	+09 28 34	L	–	110	Compact knot in the NGC 2264 IRS1 region	Monoceros
MHO 1355	06 41 17.7	+09 27 59	M	–	110	Small knot in the NGC 2264 IRS1 region	Monoceros
MHO 1356	06 41 12.7	+09 28 03	N	–	110	Compact feature in the NGC 2264 IRS1 region	Monoceros
MHO 1357	06 41 16.8	+09 27 10	O	–	112	Small, faint knot in the NGC 2264 IRS1 region	Monoceros
MHO 1358	06 41 05.0	+09 55 50	A, B, C, D, H	–	20, 40	Complex group of knots associated with bipolar outflow in NGC 2264G region	Monoceros
MHO 1359	06 41 23.0	+09 55 45	G, E, F, I	–	20, 40	Faint arcs and filaments associated with bipolar outflow in NGC 2264G region	Monoceros
MHO 1360	06 31 56.7	+04 19 05	–	HH 871	113	Small, knotty jet in the western Rosette region	Monoceros
MHO 1361	06 31 51.6	+04 19 10	–	–	178	Emission knots associated with nebulosity and cluster in the western Rosette region	Monoceros
MHO 1362	06 34 41.4	+04 07 34	–	–	178	Collimated, knotty jet 5 arcmin south of AFGL 961 in the Rosette region	Monoceros
MHO 1363	06 34 03.8	+04 33 07	–	–	178	Faint, collimated jet in the Rosette region	Monoceros
MHO 1364	06 33 41.0	+04 32 20	–	–	178	Faint, curving jet and narrow, conical nebula in the Rosette region	Monoceros
MHO 1365	06 33 27.8	+04 01 35	–	–	178	Small though bright arcs of emission a few arcmins to NW of the RNO 73 cluster	Monoceros
MHO 1366	06 34 04.0	+04 16 48	–	–	178	Faint bow shock in the Rosette region	Monoceros
MHO 1367	06 34 21.5	+04 18 31	–	–	178	Curving series of knots in the Rosette region	Monoceros
MHO 1368	06 34 21.5	+04 20 55	–	–	178	Chain of at least three knots near MHO 1369	Monoceros
MHO 1369	06 34 20.2	+04 21 11	–	–	178	Faint, collimated jet in the Rosette region	Monoceros
MHO 1370	06 34 13.6	+04 20 31	–	–	178	Curving jet in the Rosette region	Monoceros
MHO 1371	06 34 16.8	+04 20 26	–	–	178	Bright, elongated knot; possibly associated with MHO 1370	Monoceros
MHO 1372	06 34 14.0	+04 20 22	–	–	178	Bright elongated knot near MHO 1370	Monoceros
MHO 1373	06 34 12.0	+04 21 41	–	–	178	Two small bow shocks approx. 1 arcmin north of MHO 1370	Monoceros
MHO 1374	06 34 04.9	+04 20 15	–	–	178	Two small knots a few arcmin west of MHO 1370	Monoceros

Notes. [(a)] Catalogue reference for the Molecular Hydrogen emission-line Object (MHO), with coordinates. [(b)] Other acronyms and labels used in the literature. [(c)] Associated Herbig-Haro object, if any. [(d)] References to papers presenting near-IR images, listed chronologically (including papers citing other IDs); see the full list of references at the end of Table A15.

Table A.9. A list of all known MHOs in Puppis, Vela and Carina.

Object[a]	RA[a]	Dec[a]	Other ID[b]	HH[c]	References[d]	Comment	Region
MHO 1400	08 09 32.6	–36 04 58	[HL]4, IRS3/4	HH 120	17, 23, 19	Knotty emission associated with IRAS 08076-3556	Puppis
MHO 1401	08 09 35.6	–36 04 50	[HL]5	–	23	Bow shock in MHO 1401-1404 collimated jet in the GC 30 cometary globule	Puppis
MHO 1402	08 09 36.9	–36 04 23	[HL]7, 8	–	23	Bow shocks downwind of MHO 1401 in collimated outflow	Puppis
MHO 1403	08 09 32.3	–36 05 25	[HL]3	–	23	Knots in MHO 1401-1404 collimated jet in the GC 30 cometary globule	Puppis
MHO 1404	08 09 27.8	–36 06 30	[HL]1	–	23	Fainter bow in MHO 1401-1404 collimated outflow	Puppis
MHO 1405	08 09 36.5	–36 05 20	[HL]6	–	23	Arcs of emission ∼1′ southeast of HH 120 in the GC 30 cometary globule	Puppis
MHO 1406	08 09 30.9	–36 04 18	[HL]2	–	23	Elongated group of knots ∼1′ northwest of HH 120 in the GC 30 cometary globule	Puppis
MHO 1407	07 20 10.2	–24 02 21	–	HH 72	24, 38	Knots and bows in eastern lobe of MHO 1407/1408 bipolar outflow in L 1660	Puppis
MHO 1408	07 20 03.3	–24 02 19	–	HH 77	24	Diffuse knots in western lobe of MHO 1407/1408 bipolar flow in L 1660	Puppis
MHO 1409	07 44 52.0	–24 07 40	a, b	–	85	Elongated features to northwest and southeast of IRAS 07427-2400	Puppis
MHO 1410	07 44 52.0	–24 07 45	–	–	85	Faint, diffuse jet extending N-S over ∼40″ centred on IRAS 07427-2400	Puppis
MHO 1500	08 25 44.0	–51 00 30	–	HH 46/47	8, 114, 115, 9, 19	Well-known bipolar molecular outflow/HH jet and bows in Bok globule	Vela
MHO 1501	08 22 52.2	–42 07 55	–	HH 219	116, 117	Spectacular bipolar flow from nebulous source IRS 8 (IRAS 08211-4158)	Vela
MHO 1502	08 45 34.2	–43 51 54	–	–	118, 119	Collimated chain of knots and filaments associated with IRS 6 (jet 1)	Vela
MHO 1503	08 46 33.8	–43 54 40	A1-A3,B1-B2,C1-C5,D1-D2 F0-F2,G1-G5, H1-H2	–	116, 120	Spectacular collimated bipolar outflow assoc. with IRAS 08448-4343 (IRS 17) in cloud D of the Vela Molecular Ridge	Vela
MHO 1504	08 46 32.5	–43 54 35	E1 – E3	–	116, 120	Collimated, knotty jet extending ∼20 arcsec to the northwest of IRAS 08448-4343	Vela
MHO 1505	08 46 35.3	–43 54 30	57N – 57S	–	116, 120	Faint, diffuse bipolar flow close to MHO 1503 and IRAS 08448-4343	Vela
MHO 1506	08 46 35.3	–43 54 30	57E – 57W	–	116, 120	Knots on either side of nebulous IR source; in IRAS 08448-4343/IRS 17 region	Vela
MHO 1507	08 41 15.1	–40 52 15	–	–	116	Compact features in the IRAS 08393-4041 (IRS 63) region	Vela
MHO 1508	08 48 53.2	–43 32 12	–	–	116	Arc situated ∼1′ east of IRAS 08470-4321 (IRS 19)	Vela
MHO 1509	08 49 35.2	–44 11 53	–	–	118	Faint features associated with millimetre source MMS27	Vela
MHO 1510	08 49 26.0	–43 17 13	–	–	116, 118, 119	Bipolar outflow associated with bright, nebulous source IRS 20 (jet 4)	Vela
MHO 1511	08 46 34.3	–43 21 15	–	–	119	Small jet (jet 3)	Vela
MHO 1512	08 48 24.6	–43 31 37	–	–	118, 119	Collimated, knotty jet (jet 5)	Vela
MHO 1513	08 46 52.0	–43 53 01	–	–	118	Faint, diffuse though collimated flow associated with MMS5 peak	Vela
MHO 1514	08 48 57.2	–43 38 23	–	–	118	Extended knots associated with MMS17	Vela
MHO 1515	08 49 30.2	–44 04 10	–	–	118	Faint, knotty jet associated with MMS23	Vela
MHO 1516	08 50 10.0	–43 16 41	–	–	118	Chain of knots between mm sources MMS28 and MMS29	Vela
MHO 1517	08 48 15.3	–43 47 06	–	–	118, 119	Small chain of elongated knots (assoc. with MMS16, jet 2)	Vela
MHO 1518	08 48 48.5	–43 32 20	–	–	118	Knots on bow shocks to east and west of bright IR source and mm peak MMS 12	Vela
MHO 1519	08 48 53.3	–43 32 12	–	–	118	North-south collimated jet ∼1′ E of MHO 1518 (jet 6)	Vela
MHO 1600	11 12 18.9	–58 46 18	–	HH 136	121	Bright, bulbous northeastern lobe of bipolar HH 135/136 flow	Carina
MHO 1601	11 12 17.3	–58 46 30	–	HH 135	121	Bright bow shocks in southwestern lobe of HH 135/136 outflow	Carina
MHO 1602	11 59 02.5	–64 51 00	X1, BHR71	–	122, 123	Bright, knotty filament to N of nebulous YSO (assoc. with MHO 1603 and/or 1604)	Carina
MHO 1603	11 58 58.3	–64 51 31	X2, BHR71	HH 320	122, 123	Knotty feature to northeast of nebulous YSO (assoc. with MHO 1602 and/or 1604)	Carina
MHO 1604	11 59 02.5	–64 52 51	X3, BHR71	HH 321	122, 123	Knots associated with conical nebula (counter-lobe to MHO 1602 or 1603)	Carina

Notes. [(a)] Catalogue reference for the Molecular Hydrogen emission-line Object (MHO), with coordinates. [(b)] Other acronyms and labels used in the literature. [(a)] Associated Herbig-Haro object, if any. [(d)] References to papers presenting near-IR images, listed chronologically (including papers citing other IDs); see the full list of references at the end of Table A15.

Table A.10. A list of all known MHOs in Scorpius and Corona-Australis.

Object[a]	RA[a]	Dec[a]	Other ID[b]	HH[c]	References[d]	Comment	Region
MHO 1900	16 58 17.2	–42 51 43	A1 – A5	–	124	Northern group of bright features in IRAS 16547-4247 region (part of MHO 1900-1902?)	Scorpius
MHO 1901	16 58 16.4	–42 52 25	B1 – B6	–	124	Middle set of features in IRAS 16547-4247 region (part of MHO 1900-1902?)	Scorpius
MHO 1902	16 58 18.2	–42 52 59	C1 – C2	–	124	Southern group of bright objects in IRAS 16547-4247 region (part of MHO 1900-1902?)	Scorpius
MHO 1903	17 20 24.5	–35 55 02	A1, A2	–	125	Knots close to millimetre peak in NGC 6334 IV region, possibly assoc. with MHO 1904	Scorpius
MHO 1904	17 20 22.7	–35 55 31	A3, A4, A5	–	125	Knot and filament in NGC 6334 IV, possibly assoc. with MHO 1903	Scorpius
MHO 1905	17 20 23.2	–35 55 07	A6	–	125	Faint, diffuse feature in NGC 6334 IV massive star forming region	Scorpius
MHO 1906	17 20 56.3	–35 45 00	–	–	126	Compact bow-shaped feature in the NGC 6334I(N) region	Scorpius
MHO 1907	17 20 55.0	–35 46 50	B	–	20, 127, 126	Bow shock in northeast flow lobe in NGC 6334I, counter-flow to MHO 1910	Scorpius
MHO 1908	17 20 52.9	–35 46 53	C	–	20, 127, 126	Chain of knots extending to northwest in NGC 6334I	Scorpius
MHO 1909	17 20 55.3	–35 47 12	D	–	20, 127, 126	southeast facing bow shock in NGC 6334I cluster	Scorpius
MHO 1910	17 20 51.7	–35 47 07	A	–	20, 127, 126	Knots and bow shocks in counter-flow to MHO 1901 in NGC 6334I	Scorpius
MHO 1911	16 09 18.0	–39 04 55	–	–	128	Arc extending westward from embedded source in Lupus	Scorpius
MHO 1912	16 09 12.5	–39 05 03	–	HH 78	128	Two compact knots ~1arcmin west of MHO 1911	Scorpius
MHO 2000	19 02 05.5	–36 54 40	A – C	HH 99	129, 130, 40, 131	Well-defined bow shock moving northeastward from RCrA	Corona-Australis
MHO 2001	19 02 01.0	–36 56 40	D – G	–	130, 40	Knots and filaments extending ~1′ northeastward from nebulous RCrA core	Corona-Australis
MHO 2002	19 01 59.0	–36 57 15	–	–	40	Bow shaped features heading eastward from R CrA (IRS 7)	Corona-Australis
MHO 2003	19 01 50.0	–36 58 30	–	HH 100	40	Faint arc ~1.5′ southwest of RCrA	Corona-Australis
MHO 2004	19 01 45.5	–36 56 45	–	HH 104	129, 40	Faint knots and bow shocks ~1.5′ W of RCrA	Corona-Australis

Notes. [(a)] Catalogue reference for the Molecular Hydrogen emission-line Object (MHO), with coordinates. [(b)] Other acronyms and labels used in the literature. [(c)] Associated Herbig-Haro object, if any. [(d)] References to papers presenting near-IR images, listed chronologically (including papers citing other IDs); see the full list of references at the end of Table A15.

Table A.11. A list of all known MHOs in Ophiuchus.

Object[a]	RA[a]	Dec[a]	Other ID[b]	HH[c]	References[d]	Comment	Region
MHO 2100	16 26 03.1	–24 29 33	f10 – 01a, b	–	132	Two knots ∼8′ southwest of GSS30, possibly driven by YLW31	Ophiuchus
MHO 2101	16 26 13.5	–24 31 10	f10 – 02a, b	–	132	Small knot/bow shock ∼8′ south of GSS30, possibly heading northeastward	Ophiuchus
MHO 2102	16 26 16.4	–24 25 35	[GWS]19, f10 – 03a, b, A, B	–	133, 132, 40	Faint, elongated, bow-shaped feature ∼2.5′ south-southwest of GSS30	Ophiuchus
MHO 2103	16 26 16.6	–24 28 34	f10 – 01c – g	–	132	A chain of knots extending ∼1–2′ southwest from YLW31	Ophiuchus
MHO 2104	16 26 25.2	–24 27 33	f10 – 01h, i, C, D	–	132, 40	Two bows heading northeast in flow from YLW31, counter-lobe to MHO 2103?	Ophiuchus
MHO 2105	16 26 19.0	–24 23 10	H4 – H7, [GSW]11 – 14, 17, 18	HH 313	134, 130, 133, 40	Knots in north-western lobe of MHO 2105/2106 flow from VLA 1623-243	Ophiuchus
MHO 2106	16 26 33.6	–24 25 30	H1, H2, H3, [GSW]20, 21 f10 – 04a – m	–	134, 133, 132	Chain of knots and filaments in southeastern lobe of MHO 2105/2106 outflow from VLA 1623-243	Ophiuchus
MHO 2107	16 26 33.0	–24 22 13	H8, [GSW]23a – f	–	134, 133	Diffuse chain of knots ∼3′ east of GSS30	Ophiuchus
MHO 2108	16 26 47.5	–24 38 14	f04 – 01a	HH 673	132	Very faint bow shock, possibly in same flow as MHO 2109	Ophiuchus
MHO 2109	16 26 58.9	–24 37 03	[GSW]2, f04 – 01b	–	133, 132	Bow shock heading west-ward	Ophiuchus
MHO 2110	16 27 04.9	–24 47 01	f03 – 01a, b, c	–	132	Small group of faint features	Ophiuchus
MHO 2111	16 27 22.4	–24 49 13	f03 – 02a, b	HH 224	132	Arc extending northward	Ophiuchus
MHO 2112	16 27 06.4	–24 44 08	f04 – 02	–	132	Very faint knot, possibly originated from YLW16 or YLW13	Ophiuchus
MHO 2113	16 27 11.8	–24 43 58	[GSW]4, f04 – 03a	–	133, 132	Compact feature possibly originating from WLY2-42 or YLW15	Ophiuchus
MHO 2114	16 27 16.4	–24 43 55	f04 – 04	–	132	Faint knot with unknown origin	Ophiuchus
MHO 2115	16 27 07.7	–24 33 05	[GSW]3a – f, f09 – 01a – g	–	133, 132	A prominent group of shocks, possibly originating from BBRCG27	Ophiuchus
- MHO 2116	16 27 22.7	–24 29 37	[GSW]5, f09 – 02	–	133, 132	Very small bow, possibly from WL6, maybe assoc. with MHO 2117	Ophiuchus
MHO 2117	16 27 25.9	–24 28 57	[GSW]6, f09 – 03	–	133, 132	Small bow, possibly originating from WLY2-48, maybe assoc. with MHO 2116	Ophiuchus
MHO 2118	16 27 27.4	–24 39 48	f04 – 05a, b, c	–	132	A group of very faint knots around YLW16	Ophiuchus
MHO 2119	16 27 28.1	–24 37 56	f04 – 06	–	132	Very faint knot possibly assoc. with YLW16	Ophiuchus
MHO 2120	16 27 28.3	–24 40 28	[GSW]7e, f04 – 03b	–	133, 132	Faint knots possibly originating from nebulous IR source YLW15	Ophiuchus
MHO 2121	16 27 31.8	–24 38 35	[GSW]7d, f04 – 05d	HH 674	133, 132	Small though distinct knots originating from YLW16	Ophiuchus
MHO 2122	16 27 34.1	–24 39 17	f04 – 03c, d	–	132	Faint knots, possibly in collimated flow from YLW15	Ophiuchus
MHO 2123	16 27 35.3	–24 38 11	[GSW]7c, f04 – 05e, f, g, h	–	133	Faint knots possibly originating from YLW16 (downwind of MHO 2121?)	Ophiuchus
MHO 2124	16 27 40.1	–24 37 59	[GSW]7a, b, f04 – 03e, f	–	133, 132	Two knots/bows, possibly in northeast lobe of outflow from YLW15	Ophiuchus
MHO 2125	16 27 39.5	–24 41 49	f05 – 01	–	132	Very faint bow, possibly from YLW18	Ophiuchus
MHO 2126	16 27 45.5	–24 45 01	f05 – 02a, b	–	132	Knots close to, though on either side of, nebulous IR source	Ophiuchus
MHO 2127	16 27 50.4	–24 40 06	f05 – 03	–	132	A very compact knot of unknown origin	Ophiuchus
MHO 2128	16 27 43.0	–24 31 56	f08 – 01a	–	135, 132	Curving shock front, possibly a bow driven by YLW52 ∼2′ to east	Ophiuchus
MHO 2129	16 27 51.8	–24 31 45	f08 – 01b, c, d	–	132	Chain of knots and shock bubbles to east and west of IR source YLW52	Ophiuchus
MHO 2130	16 27 58.2	–24 31 26	f08 – 01e, f	–	132	Two elongated knots/bow wings, possibly originating from YLW52 ∼2′ to west	Ophiuchus
MHO 2131	16 28 03.8	–24 30 53	f08 – 01g, h	–	132	Faint features, possibly in outflow from YLW52 or downwind of MHO 2130	Ophiuchus
MHO 2132	16 28 19.3	–24 37 05	f05 – 04a, b, c	–	132	Distinct bows/arcs extending southeastward from embedded protostar MMS125	Ophiuchus
MHO 2133	16 26 43.7	–24 34 50	[GSW]1	–	133	Diffuse knot extending east from WL12	Ophiuchus
MHO 2134	16 26 06.5	–24 21 34	[GSW]8a – d	–	133	Group of knots extending to northeast and southwest of GSS 26	Ophiuchus

Table A.11. continued.

Object[a]	RA[a]	Dec[a]	Other ID[b]	HH[c]	References[d]	Comment	Region
MHO 2135	16 26 17.2	–24 18 01	[GSW]9	–	133	Small group of faint knots	Ophiuchus
MHO 2136	16 26 20.6	–24 21 24	[GSW]10	–	133	Small, faint feature	Ophiuchus
MHO 2137	16 26 25.4	–24 23 00	[GSW]15, 16	–	133	Knots to northwest and southeast of IR source/conical nebula	Ophiuchus
MHO 2138	16 26 38.3	–24 18 30	[GSW]24a	–	133	Faint, bow-shaped arc ∼1.5′ northwest of Elias 2-26 and HH 79	Ophiuchus
MHO 2139	16 26 29.0	–24 20 21	[GSW]24b	–	133	Faint arc, possibly associated with MHO 2140 and/or 2141	Ophiuchus
MHO 2140	16 26 26.8	–24 20 21	[GSW]24c	–	133	Faint knot, possibly associated with MHO 2139 and/or 2141	Ophiuchus
MHO 2141	16 26 27.8	–24 21 10	[GSW]24d	–	133	Diffuse feature, possibly associated with MHO 2139 and/or 2140	Ophiuchus
MHO 2142	16 26 44.3	–24 20 09	–	HH 79	133	Complex of knots and arcs ∼1′ east of Elias 2-26	Ophiuchus
MHO 2143	16 27 10.5	–24 17 48	[GSW]25a, b	–	133	Small, nested bow-shocks directed eastward	Ophiuchus
MHO 2144	16 27 17.7	–24 25 05	[GSW]26	–	133	Faint, diffuse feature	Ophiuchus
MHO 2145	16 27 09.4	–24 37 19	1, 2a, 2b	–	136	Small, precessing bipolar jet from protostar Elias 29/WL 15	Ophiuchus
MHO 2146	16 27 13.0	–24 38 15	3a, 3b	–	136	Faint bow shocks ∼1′ downwind of Elais 29 and MHO 2145	Ophiuchus

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Table A.12. A list of all known MHOs in Serpens.

Object[a]	RA[a]	Dec[a]	Other ID[b]	HH[c]	References[d]	Comment	Region
MHO 2200	18 17 29.8	–04 39 38	–	–	137	Knotty east-west bipolar outflow in L 483, driven by IRAS 18148-0440	Serpens
MHO 2201	18 17 57.7	–12 07 19	[VDR]14 – 1	–	138, 71	Spectacular bipolar jet from nebulous IR source near IRAS 18151-1208	Serpens
MHO 2202	18 17 57.2	–12 07 30	[VDR]14 – 2	–	138, 71	Collimated flow near IRAS 18151-1208, orthogonal to MHO 2201	Serpens
MHO 2203	18 29 16.6	–11 50 17	[VDR]18 – 1a	–	71	Sequence of features extending over ∼40″ to west of IRAS 18264-1152	Serpens
MHO 2204	18 29 13.0	–11 50 16	[VDR]18 – 1b/18 – 4	–	71	Knots and bow shocks in flow to east of IRAS 18264-1152 (assoc. with MHO 2203?)	Serpens
MHO 2205	18 29 16.9	–11 49 54	[VDR]18 – 3	–	71	Diffuse object ∼1′ to northeast of IRAS 18264-1152	Serpens
MHO 2206	18 34 22.7	–05 59 59	[TRH]A, B, C, D, [VDR]19 – 1	–	139, 71	Group of bright features ∼45″ southeast of IRAS 18316-0602	Serpens
MHO 2207	18 34 20.5	–05 59 38	[VDR]19 – 2	–	71	Faint object just to northeast of IRAS 18316-0602	Serpens
MHO 2208	18 34 18.4	–05 59 07	[VDR]19 – 3	–	71	Small object ∼45″ northwest of IRAS 18316-0602	Serpens
MHO 2209	18 34 18.8	–05 59 25	[TRH]E, [VDR]19 – 4	–	139, 71	Compact feature ∼25″ northwest of IRAS 18316-0602	Serpens
MHO 2210	18 34 21.3	–06 00 12	[VDR]19 – 5	–	71	Diffuse object ∼30″ southeast of IRAS 18316-0602	Serpens
MHO 2211	18 37 16.9	–06 38 27	[VDR]20 – 1	–	71	Group of faint, compact emission features near IRAS 18345-0641	Serpens
MHO 2212	18 17 55.4	–12 06 42	[VDR]14 – 3	–	71	Bow shock, extension of northwestern lobe of MHO 2201 in IRAS 18151-1208 region	Serpens
MHO 2213	18 29 04.9	–01 41 53	–	–	26	Arcs to northwest of nebulous source IRAS 18264+0143	Serpens
MHO 2214	18 29 40.3	–01 51 28	–	–	26	Two small southward-facing bow shocks to southeast of IRAS 18270-0153	Serpens
MHO 2215	18 29 37.8	+01 18 30	–	HH 460	140	Large patch of knots and filaments in northwest Serpens	Serpens
MHO 2216	18 29 45.7	+01 18 15	–	–	140	Faint, diffuse patch of emission	Serpens
MHO 2217	18 29 49.5	+01 16 50	S9, S10	–	142, 140, 141, 40	Knotty curving jet to northwest of nebulous IR source	Serpens
MHO 2218	18 29 49.6	+01 16 35	S8	–	142, 140, 141, 40	Complex twisting chain of knots that crosses the MHO 2217 jet	Serpens
MHO 2219	18 29 48.1	+01 16 45	–	–	40, 140	Small group of knots	Serpens
MHO 2220	18 29 48.0	+01 16 09	S7	–	142, 140, 141, 40	Curving knot, continuation of MHO 2222?	Serpens

Table A.12. continued.

Object[a]	RA[a]	Dec[a]	Other ID[b]	HH[c]	References[d]	Comment	Region
MHO 2221	18 29 53.7	+01 15 54	S11	–	142, 140, 141, 40	Bow shock to southeast of nebulous source, MHO 2217 counter-flow	Serpens
MHO 2222	18 29 49.2	+01 15 40	S6	–	142, 140, 40	Diffuse, knotty flow, associated with MHO 2220	Serpens
MHO 2223	18 29 45.0	+01 15 06	–	–	140	Faint group of knots to west of Serpens cloud core	Serpens
MHO 2224	18 29 50.0	+01 14 51	S12	–	142, 140, 40	Small group of knots, associated with MHO 2222/2232 flow lobe	Serpens
MHO 2225	18 29 52.8	+01 14 59	S4	–	142, 140, 40	Cone of emission in Serpens cloud core	Serpens
MHO 2226	18 29 55.5	+01 15 10	–	–	40, 140	Faint emission in central nebulous Serpens region	Serpens
MHO 2227	18 30 01.6	+01 16 06	–	–	140	Patch of emission to northeast of main Serpens core	Serpens
MHO 2228	18 30 02.7	+01 14 46	–	HH 459	140	Small group of knots to northeast of SVS 20 (associated with MHO 2231)	Serpens
MHO 2229	18 29 59.2	+01 14 08	–	–	142, 140	Collimated, knotty jet in centre of Serpens core	Serpens
MHO 2230	18 29 50.6	+01 14 16	S5	–	142, 140, 40	Large knotty bow shock downwind of MHO 2224	Serpens
MHO 2231	18 29 58.0	+01 13 45	–	HH 458	142, 140	Compact knots in HH 458/459 jet (assoc. with MHO 2228)	Serpens
MHO 2232	18 29 51.5	+01 13 10	–	–	140	Faint bow to west of SVS 20, extension of MHO 2222/2224/2230 flow lobe?	Serpens
MHO 2233	18 29 12.0	+00 31 30	–	–	143	Cone of emission in Serpens/G3-G6 northeast region	Serpens
MHO 2234	18 29 09.0	+00 31 00	–	–	143	Curving knotty cone assoc. with mm source in Serpens/G3-G6 northeast region	Serpens
MHO 2235	18 29 06.5	+00 30 30	–	–	143	Curving knotty jet extending southwest from source in Serpens/G3-G6 NE core	Serpens

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Table A.13. A list of all known MHOs in Sagittarius, Aquila and Vulpecula.

Object[a]	RA[a]	Dec[a]	Other ID[b]	HH[c]	References[d]	Comment	Region
MHO 2300	18 20 26.3	–16 12 10	–	–	144	Jet from silhouette disk in M17	Sagittarius
MHO 2301	18 06 14.4	–20 31 36	–	–	145	Single knot in massive star-forming cluster G9.62+0.19	Sagittarius
MHO 2302	18 17 23.1	–17 22 13	[VDR]13 – 1	–	71	Compact feature ∼20″ west of IRAS 18144-1723	Sagittarius
MHO 2400	19 36 57.2	+07 34 01	IR1	HH 119B	146, 147	Bow shock in western lobe of B335 outflow	Aquila
MHO 2401	19 37 01.5	+07 34 08	IR2	–	146, 147	Knots in eastern lobe of outflow from B335	Aquila
MHO 2402	19 37 03.9	+07 33 50	IR3	–	146, 147	Arcs and filaments in eastern B335	Aquila
MHO 2403	19 37 05.2	+07 33 39	IR4	HH 119G	146, 147	Knots and bow shocks in southeast corner of B335 globule	Aquila
MHO 2404	19 37 05.7	+07 34 10	IR5	HH 119D	146, 147	Bow shock downwind of MHO 2401 in eastern lobe of B335 outflow	Aquila
MHO 2405	19 36 51.4	+07 34 12	IR7	HH 119A	147	Knots and filaments in western B335	Aquila
MHO 2406	19 36 46.0	+07 34 29	IR8	HH 119I	147	Complex group of knots, arcs and filaments in western B35	Aquila
MHO 2407	19 20 29.5	+11 02 01	–	HH 32	148	Bow shock in obliquely-viewed HH jet	Aquila
MHO 2408	19 23 18.1	+14 27 38	–	–	149	Faint, compact knots in W51	Aquila
MHO 2409	19 23 18.5	+14 26 56	–	–	149	Faint feature in W51	Aquila
MHO 2410	19 23 19.6	+14 26 54	–	–	149	Faint feature ∼10″ east of MHO 2409 in W51	Aquila
MHO 2411	19 23 22.0	+14 33 33	–	–	149	Two small knots in W51	Aquila

Table A.13. continued.

Object[a]	RA[a]	Dec[a]	Other ID[b]	HH[c]	References[d]	Comment	Region
MHO 2412	19 23 23.8	+14 25 30	N	–	149	Small group of knots in W51, assoc. with MHO 2413?	Aquila
MHO 2413	19 23 23.3	+14 25 02	S	–	149	Chain of knots in W51, assoc. with MHO 2412?	Aquila
MHO 2414	19 23 25.9	+14 37 03	–	–	149	Faint knots in W51	Aquila
MHO 2415	19 23 27.9	+14 37 01	–	–	149	Faint feature east of MHO 2414 in W51	Aquila
MHO 2416	19 23 35.0	+14 30 28	–	–	149	Bright-ish knot in W51	Aquila
MHO 2417	19 23 36.6	+14 30 14	–	–	149	Faint feature in W51	Aquila
MHO 2418	19 23 38.3	+14 30 47	–	–	149	Faint object in W51	Aquila
MHO 2419	19 23 39.7	+14 31 31	A, B, C	–	149	Group of northward-facing nested bow shocks in W51	Aquila
MHO 2420	19 23 45.5	+14 35 37	–	–	149	Two small knots in W51	Aquila
MHO 2421	19 23 47.2	+14 29 44	–	–	149	Emission assoc. with IR source in W51	Aquila
MHO 2422	19 24 03.3	+14 32 55	–	–	149	Small though extended feature in W51	Aquila
MHO 2600	19 39 34.9	+23 59 39	[VDR]30 – 1	–	71	Bright knots to ∼25″ southeast of IRAS 19374+2352	Vulpecula
MHO 2601	19 39 33.3	+23 59 59	[VDR]30 – 2	–	71	Compact knots near IRAS 19374+2352	Vulpecula
MHO 2602	19 39 34.0	+23 59 55	[VDR]30 – 3	–	71	Compact feature near IRAS 19374+2352	Vulpecula
MHO 2603	19 43 12.9	+23 43 59	[BSS]1, [VDR]32 – 1	–	150, 71	Arcuate features (bow shocks) ∼20″ east of IRAS 19410+2336	Vulpecula
MHO 2604	19 43 12.2	+23 44 11	[BSS]2, [VDR]32 – 2	–	150, 71	Bright, collimated lobe extending northeast of IRAS 19410+2336	Vulpecula
MHO 2605	19 43 10.1	+23 43 57	[BSS]3, [VDR]32 – 3	–	150, 71	Knots in counter-lobe to MHO 2604 (from IRAS 19410+2336)	Vulpecula
MHO 2606	19 43 08.3	+23 44 07	[BSS]4 – 6, [VDR]32 – 4, 5, 6, 11, 12	–	150, 71	Faint features to west of IRAS 19410+2336, counter-flow to MHO 2603?	Vulpecula
MHO 2607	19 43 11.7	+23 44 35	[BSS]7 – 8, [VDR]32 – 7/32 – 8	–	150, 71	Faint knots north of IRAS 19410+2336	Vulpecula
MHO 2608	20 07 07.0	+27 28 55	[VDR]33 – 1	–	71	Faint emission lobe extending east from IRAS 20050+2720	Vulpecula
MHO 2609	20 07 02.1	+27 29 16	[VDR]33 – 2	–	71	Diffuse feature ∼1′ northwest of IRAS 20050+2720	Vulpecula
MHO 2610	20 07 02.9	+27 29 07	[VDR]33 – 3	–	71	Compact feature ∼1′ west of IRAS 20050+2720 (counter-flow to MHO 2608?)	Vulpecula
MHO 2611	20 07 02.4	+27 28 50	[VDR]33 – 4	–	71	Small feature ∼1′ west of IRAS 20050+2720	Vulpecula
MHO 2612	20 07 02.7	+27 28 24	[VDR]33 – 5	–	71	Small object ∼1′ southwest of IRAS 20050+2720	Vulpecula
MHO 2613	19 40 59.6	+24 04 48	[VDR]31 – 1	–	71	Small object near to IRAS 19388+2357	Vulpecula
MHO 2614	19 40 60.0	+24 04 44	[VDR]31 – 2	–	71	Small object near to IRAS 19388+2357	Vulpecula
MHO 2615	19 40 59.3	+24 04 41	[VDR]31 – 3	–	71	Small object near to IRAS 19388+2357	Vulpecula
MHO 2616	19 46 19.5	+24 35 25	S87C, E	–	94	Two jet-like features in busy S87 star-forming region	Vulpecula
MHO 2617	19 17 51.6	+19 12 40	H2 – NW	–	151	Elongated knot ∼30″ northwest of YSO in L 723; assoc. with MHO 2623?	Vulpecula
MHO 2618	19 17 57.7	+19 11 52	H2 – SE	–	151	Knotty filament ∼50″ southeast of YSO in L 723; MHO 2622 counter-flow?	Vulpecula
MHO 2619	19 17 54.3	+19 12 16	K1, K2	–	151	Two compact knots midway between MHO 2622 and 2623 in L 723	Vulpecula
MHO 2620	19 43 10.7	+23 45 09	[BSS]9, 10, [VDR]32 – 9/32 – 10	–	150, 71	Small knot in the IRAS 19410+2336 region	Vulpecula
MHO 2621	19 43 11.0	+23 46 00	[BSS]11, 12	–	150	Two faint features ∼2′ north of IRAS 19410+2336	Vulpecula

Notes. [(a)] Catalogue reference for the Molecular Hydrogen emission-line Object (MHO), with coordinates. [(b)] Other acronyms and labels used in the literature. [(c)] Associated Herbig-Haro object, if any. [(d)] References to papers presenting near-IR images, listed chronologically (including papers citing other IDs); see the full list of references at the end of Table A15.

Table A.14. A list of all known MHOs in Cepheus.

Object[a]	RA[a]	Dec[a]	Other ID[b]	HH[c]	References[d]	Comment	Region
MHO 2700	22 32 24.0	+58 19 02	[VDR]48 – 1	–	71	Diffuse emission just to north of IRAS 22305+5803	Cepheus
MHO 2701	22 59 05.0	+59 28 18	[VDR]49 – 1	–	71	Collimated jet just to southwest of IRAS 22570+5912	Cepheus
MHO 2702	22 58 59.2	+59 27 38	[VDR]49 – 2	–	71	Features ∼75″ southwest of IRAS 22570+5912	Cepheus
MHO 2703	22 56 02.0	+62 02 00	CepA(W)	HH 168	152, 153, 154	Western lobe of bright, complex, bipolar outflow (MHO 2703-2705)	Cepheus
MHO 2704	22 56 30.0	+62 02 20	CepA(E)	HH 169	155, 156, 152, 153, 154	Eastern lobe of bright, complex, bipolar flow (MHO 2703-2705)	Cepheus
MHO 2705	22 56 55.0	+62 01 50	CepA(E)	HH 174	157, 152, 153, 154	Bow shocks near end of eastern lobe of MHO 2703-2705 bipolar flow	Cepheus
MHO 2706	23 03 13.5	+61 42 40	N1 – N3	–	158, 159, 160, 161	Northern lobe of collimated MHO 2706/2707 bipolar outflow in Cep E	Cepheus
MHO 2707	23 03 11.5	+61 42 05	S1	–	158, 159, 160, 161	Southern lobe of MHO 2706/2707 outflow in Cep E	Cepheus
MHO 2708	23 03 11.3	+61 42 27	W1 – W2	–	158, 159	Knots in flow extending westward from MHO 2706/2707 source region in Cep E	Cepheus
MHO 2709	20 39 05.7	+68 02 15	A – D	–	20	Well-defined bipolar outflow in L 1157 (assoc. with IRAS 20386+6751)	Cepheus
MHO 2710	23 17 19.1	+59 28 52	H2 : 1 – H2 : 3	–	162	Faint arc of emission associated with IRAS 23151+5912	Cepheus
MHO 2711	23 17 22.9	+59 28 51	H2 : 4 – H2 : 8	–	162	Knotty jet extending from IRAS 23151+5912	Cepheus
MHO 2712	21 43 17.0	+66 09 00	II	–	28	Emission knots just north of large MHO 2714 flow in NGC 7129	Cepheus
MHO 2713	21 42 28.0	+66 08 35	IIIA/IIIB	–	28	Faint opposite-facing bow shocks to northwest of LkHa 234 in the NGC 7129 region	Cepheus
MHO 2714	21 43 20.0	+66 07 45	–	HH 105	163, 28	Large, complex northeastern lobe of emission from LkHa 234 in NGC 7129	Cepheus
MHO 2715	21 42 28.0	+66 04 30	–	–	28	Bright knots in southwestern lobe from LkHa234 in NGC 7129 (assoc. with GGD 32)	Cepheus
MHO 2716	21 42 25.0	+66 03 30	–	HH 103	163, 28	Knots and features in southwestern lobe from LkHa234 in NGC 7129	Cepheus
MHO 2717	21 43 20.0	+66 05 00	VIB	–	28	Bow shock in the NGC 7129 region, extension of MHO 2719 flow?	Cepheus
MHO 2718	21 42 58.0	+66 05 00	VB	–	28	Small feature in NGC 7129, possible in same flow as MHO 2723	Cepheus
MHO 2719	21 43 09.0	+66 04 20	VIA	–	28	Knotty northeast-southwest orientated flow in NGC 7129	Cepheus
MHO 2720	21 42 55.0	+66 04 10	–	–	28	Northwestern lobe of bipolar flow from FIR source in NGC 7129 (assoc. with MHO 2724)	Cepheus
MHO 2721	21 42 40.0	+66 04 10	IV	–	28	Small bow-shaped feature in NGC 7129	Cepheus
MHO 2722	21 43 06.0	+66 03 35	VII	–	28	Emission just to northeast of MHO 2720/2724 flow in the NGC 7129 region	Cepheus
MHO 2723	21 42 47.0	+66 03 35	VA	–	28	Small feature in NGC 7129, possible in same flow as MHO 2718	Cepheus
MHO 2724	21 43 06.0	+66 02 45	–	–	28	Southeastern lobe of bipolar flow from FIR source in NGC 7129 (assoc. with MHO 2720)	Cepheus
MHO 2725	23 05 24.5	+60 08 17	a – e	–	85	Group of knots associated with IRAS 23033+5951	Cepheus
MHO 2726	21 17 38.1	+68 17 41	CB230k1 – k2	–	164	Knotty jet extending northward from conical nebula (IRAS 21169+6804) in CB230 globule	Cepheus
MHO 2727	22 19 25.3	+63 34 07	–	–	80	Bow shocks in collimated MHO 2727-2729 jet in S140N	Cepheus
MHO 2728	22 19 33.8	+63 33 01	–	HH 251	80	Emission assoc. with collimated MHO 2727-2729 jet in S140N	Cepheus
MHO 2729	22 19 43.1	+63 31 36	–	HH 253	80	Compact features in MHO 2727-2729 jet in S140N	Cepheus
MHO 2730	23 13 45.0	+61 28 20	–	–	80, 165	Large arcs of emission either side of NGC 7538 IRS1	Cepheus
MHO 2731	23 14 00.5	+61 28 00	–	–	80, 165	Bow shock in northern counter-flow to MHO 2732 in NGC 7538	Cepheus
MHO 2732	23 14 04.0	+61 26 38	–	–	80, 165	Jet and Bow shock extending ∼1′ southward from NGC7538 IRS9	Cepheus
MHO 2733	22 58 46.9	+58 45 04	K1, K2	–	166	Two faint knots ∼1.5′ south of Sh2-152	Cepheus
MHO 2734	22 58 39.6	+58 44 45	K3 – K5	–	166	Knots and diffuse emission south of Sh2-152	Cepheus
MHO 2735	22 58 43.0	+58 45 22	K6 – K9	–	166	Small group of knots, possible extension of MHO 2734	Cepheus
MHO 2736	23 16 05.5	+60 01 34	K1	–	166	Compact knot ∼1′ south of Sh2-157	Cepheus

Table A.14. continued.

Object[a]	RA[a]	Dec[a]	Other ID[b]	HH[c]	References[d]	Comment	Region
MHO 2737	23 15 51.5	+60 03 05	K2	–	166	Compact feature ~3′ northwest of Sh2-157	Cepheus
MHO 2738	21 40 47.6	+58 16 03	N	–	167, 40, 168	Very faint patch of emission in the IC1396-N globule (nr MHO 2753)	Cepheus
MHO 2739	21 40 35.0	+58 18 22	C	–	167, 40, 168	Arc in north of IC1396-N globule	Cepheus
MHO 2740	21 40 45.0	+58 17 50	F, O	–	167, 40, 168	Faint arc in IC1396-N	Cepheus
MHO 2741	21 40 35.9	+58 17 38	E, P	–	167, 40, 168	Compact knot in IC1396-N	Cepheus
MHO 2742	21 40 42.2	+58 18 40	D	–	167, 40, 168	Compact knot in northern IC1396-N	Cepheus
MHO 2743	21 40 56.1	+58 16 40	B	–	167, 40, 168	Curving filament in IC1396-N globule (extension of MHO 2753?)	Cepheus
MHO 2744	21 36 08.0	+57 26 37	–	–	170	Collimated jet in the IC 1396A globule	Cepheus
MHO 2745	22 15 10.5	+58 49 13	–	–	85	Knot of emission extending eastward from molecular ring assoc. with IRAS 22134+5834	Cepheus
MHO 2746	20 05 19.0	+59 53 55	–	–	170	Collimated jet extending northwest-southeast over ~1′ in the IRAS 23032+5937 region	Cepheus
MHO 2747	20 05 21.5	+59 53 52	–	–	170	Knots and emission elongated east-west in the IRAS 23032+5937 region	Cepheus
MHO 2748	20 05 23.5	+59 53 55	–	–	170	Collimated N-S flow driven by an embedded source in the IRAS 23032+5937 region	Cepheus
MHO 2749	20 05 27.5	+59 54 07	–	–	170	Arc/bow shock extending to the northeast in the IRAS 23032+5937 region	Cepheus
MHO 2750	20 05 26.8	+59 53 12	–	–	170	Nebulous emission region ~1′ southeast of the central IRAS 23032+5937 cluster	Cepheus
MHO 2751	20 05 21.5	+59 53 00	–	–	170	Multiple bow-shocks ~1′ south of IRAS 23032+5937	Cepheus
MHO 2752	20 57 11.7	+77 35 47	–	–	171	East-west flow near IRAS 20582+7724 in L 1228	Cepheus
MHO 2753	21 40 44.7	+58 16 19	A, [VDR]45 – 1	–	167, 40, 26, 71	Complex flow lobe extending northeast of IRAS 21391+5802 (IC1396-N)	Cepheus
MHO 2754	21 40 40.7	+58 15 51	Q, [VDR]45 – 2/45 – 3	–	167, 40, 71	Knots in MHO 2753 (or MHO 2755?) counter-flow from IRAS 21391+5802	Cepheus
MHO 2755	21 40 46.0	+58 16 12	M, [VDR]45 – 4/45 – 5	HH 593	167, 40, 26, 168, 71	Bow shocks 20-40″ east of IRAS 21391+5802	Cepheus
MHO 2756	21 40 41.3	+58 16 09	K, [VDR]45 – 6	–	167, 40, 26, 168, 71	Feature just to west of IRAS 21391+5802	Cepheus
MHO 2757	21 40 40.2	+58 16 02	K, [VDR]45 – 7	–	167, 40, 26, 168, 71	Arc ~20″ to west of Faint emission ~30″ west of IRAS 21391+5802	Cepheus
MHO 2758	21 40 38.8	+58 16 16	I, [VDR]45 – 8	–	167, 40, 168, 71	Faint emission ~30″ west of IRAS 21391+5802	Cepheus
MHO 2759	21 40 36.4	+58 16 21	H, [VDR]45 – 9	–	167, 40, 168, 71	Faint emission ~45″ west of IRAS 21391+5802	Cepheus
MHO 2760	21 40 36.7	+58 16 47	J, [VDR]45 – 10	–	167, 40, 168, 71	Faint knot ~1′ northwest of IRAS 21391+5802	Cepheus
MHO 2761	21 40 39.2	+58 16 52	G, [VDR]45 – 11	–	167, 40, 168, 71	Collimated flow ~1′ northwest of IRAS 21391+5802	Cepheus
MHO 2762	21 40 40.6	+58 15 12	R, [VDR]45 – 12	–	167, 40, 168, 71	Faint, collimated flow ~1′ southwest of IRAS 21391+5802	Cepheus
MHO 2763	21 53 38.8	+56 28 00	[VDR]46 – 2	–	71	Faint, collimated flow 20–30″ north of IRAS 21519+5613	Cepheus
MHO 2764	21 53 38.7	+56 27 49	[VDR]46 – 1	–	71	Faint, collimated flow 5–10″ north of IRAS 21519+5613	Cepheus
MHO 2765	22 19 09.9	+56 05 11	[VDR]47 – 1/47 – 2/47 – 3/47 – 4	–	172, 71	Group of knots ~20″ north of IRAS 22172+5549	Cepheus
MHO 2766	22 19 09.5	+56 04 38	[VDR]47 – 5	–	71	Faint, collimated flow associated with IRAS 22172+5549	Cepheus
MHO 2767	21 26 33.8	+57 57 56	[FS]1a – 1h	–	179	Chain of knots in the IC 1396W globule	Cepheus
MHO 2768	21 26 04.9	+57 56 29	[FS]2a – 1n	–	179	4 arcmin long chain of knots in IC 1396W; assoc. with IRAS 21246+5743	Cepheus
MHO 2769	21 25 42.5	+57 57 23	[FS]3a – 3f	–	179	Knotty jet in IC 1396W	Cepheus
MHO 2770	21 26 19.5	+57 56 59	[FS]4	–	179	Elongated knot near MHO 2768 in IC 1396W	Cepheus
MHO 2771	21 26 07.9	+57 56 05	[FS]5	–	179	Compact knot near MHO 2768 in IC 1396W	Cepheus
MHO 2772	21 25 57.6	+57 55 22	[FS]6	–	179	Elongated knot near MHO 2768 in IC 1396W	Cepheus

Notes. [(a)] Catalogue reference for the Molecular Hydrogen emission-line Object (MHO), with coordinates. [(b)] Other acronyms and labels used in the literature. [(c)] Associated Herbig-Haro object, if any. [(d)] References to papers presenting near-IR images, listed chronologically (including papers citing other IDs); see the full list of references at the end of Table A15.

Table A.15. A list of all known MHOs in Cassiopeia and Chamaeleon.

Object[a]	RA[a]	Dec[a]	Other ID[b]	HH[c]	References[d]	Comment	Region
MHO 2900	00 44 56.6	+55 46 53	[VDR]1 – 1	–	71	Faint feature ~30″ south of IRAS 00420+5530	Cassiopeia
MHO 2901	00 44 57.6	+55 46 56	[VDR]1 – 2	–	71	Faint feature ~30″ south of IRAS 00420+5530	Cassiopeia
MHO 2902	00 44 58.9	+55 47 11	[VDR]1 – 3	–	71	Faint line emission southeast of IRAS 00420+5530	Cassiopeia
MHO 2903	00 45 01.3	+55 47 36	[VDR]1 – 4	–	71	Faint object ~40″ northeast of IRAS 00420+5530	Cassiopeia
MHO 2904	00 21 00.7	+62 39 38	–	–	26	Two faint southward-facing bow shocks near IRAS 00182+6223	Cassiopeia
MHO 2907	00 28 42.2	+56 41 57	CB3k1 – k4	–	164	North-south chain of 4 knots in globule CB3	Cassiopeia
MHO 2908	03 27 34.5	+58 47 00	–	–	80	Collimated jet extending N-S over ~2′ in the AFGL 490 region	Cassiopeia
MHO 2909	03 27 34.8	+58 46 20	A	–	80	Bright, elongated knot ~1′ southwest of AFGL 490 IRS	Cassiopeia
MHO 2910	01 23 18.3	+61 48 12	S187 : SCP1	–	173	Remarkable curving arc of knots and emission in the S187 region	Cassiopeia
MHO 2911	01 23 22.0	+61 48 54	S187 : SCP2	–	173	Small group of knots ~30″ northwest of IRAS 01202+6133 in S187	Cassiopeia
MHO 2912	01 23 31.7	+61 47 35	S187 : SCP3	–	173	Elongated feature ~1.5′ south of IRAS 01202+6133 in S187	Cassiopeia
MHO 2913	01 23 35.7	+61 47 37	S187 : SCP4	–	173	Bow shaped feature next to MHO 2912 in S187	Cassiopeia
MHO 2914	01 23 31.0	+61 50 25	S187 : SCP5	–	173	Group of knots ~1.5′ north of IRAS 01202+6133 in S187	Cassiopeia
MHO 3000	12 55 50.3	–76 56 23	–	HH 54	8, 17, 174, 40, 175	Group of bright knots, arcs and filaments	Chameleon
MHO 3001	11 09 22.4	–76 33 33	A	–	176	Faint feature in western outflow lobe from ISO-ChaI 192	Chameleon
MHO 3002	11 09 22.5	–76 34 34	B1, B2	–	176	Two knots on either side of T Tauri star C1-6	Chameleon
MHO 3003	11 09 48.9	–76 33 59	C1 – C3	–	176	Knotty bow shock in eastern outflow lobe from ISO-ChaI 192	Chameleon
MHO 3004	11 09 49.6	–76 34 38	D	–	176	Faint arc, possibly part of eastern ISO-ChaI 192 flow lobe and/or MHO 3003	Chameleon
MHO 3005	12 55 15.5	–76 57 30	–	HH 53	177	Group of knots and filaments ~1.5′ southwest of MHO 3000/HH 54	Chameleon
MHO 3006	12 55 07.5	–76 57 55	–	HH 52	177	Group of knots ~2.0′ southwest of MHO 3000/HH 54	Chameleon

Notes. [a] Catalogue reference for the Molecular Hydrogen emission-line Object (MHO), with coordinates. [b] Other identification used in the literature. [c] Associated Herbig-Haro object, if any. [d] References to papers presenting near-IR images (including papers citing other IDs): 1. Stanke et al. (2002), 2. Davis et al. (2009), 3. Yu et al. (1997), 4. Yu et al. (2000), 5. Stanke et al. (1998), 6. Gålfalk & Olofsson (2007a), 7. Gålfalk & Olofsson (2008), 8. Zealey et al. (1993), 9. Reipurth et al. (2000b), 10. Davis et al. (2000a), 11. Zealey et al. (1992), 12. Davis et al. (1994b), 13. Davis et al. (2000b), 14. Noriega-Crespo et al. (1994), 15. Noriega-Crespo et al. (1997), 16. Reipurth et al. (2000a), 17. Gredel (1994), 18. Schwartz & Greene (1999), 19. Schwartz, Greene (2003), 20. Davis & Eislöffel (1995), 21. Schwartz et al. (1997), 22. Chrysostomou et al. (2000), 23. Hodapp & Ladd (1995), 24. Davis et al. (1997), 25. O'Connell et al. (2004), 26. Connelley et al. (2007), 27. 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