= Corona Borealis =

Corona Borealis is a small constellation in the Northern Celestial Hemisphere . It is one of the 48 constellations listed by the 2nd @-@ century astronomer Ptolemy , and remains one of the 88 modern constellations . Its brightest stars form a semicircular arc . Its Latin name , inspired by its shape , means " northern crown " . In classical mythology Corona Borealis generally represented the crown given by the god Dionysus to the Cretan princess Ariadne and set by him in the heavens . Other cultures likened the pattern to a circle of elders , an eagle 's nest , a bear 's den , or even a smokehole . Ptolemy also listed a southern counterpart , Corona Australis , with a similar pattern .

The brightest star is the magnitude 2 @.@ 2 Alpha Coronae Borealis . The yellow supergiant R Coronae Borealis is the prototype of a rare class of giant stars ? the R Coronae Borealis variables ? that are extremely hydrogen deficient , and thought to result from the merger of two white dwarfs . T Coronae Borealis , also known as the Blaze Star , is another unusual type of variable star known as a recurrent nova . Normally of magnitude 10 , it last flared up to magnitude 2 in 1946 . ADS 9731 and Sigma Coronae Borealis are multiple star systems with six and five components respectively . Five star systems have been found to have Jupiter @-@ sized exoplanets . Abell 2065 is a highly concentrated galaxy cluster one billion light @-@ years from the Solar System containing more than 400 members , and is itself part of the larger Corona Borealis Supercluster .

= = Characteristics = =

Covering 179 square degrees and hence 0 @.@ 433 % of the sky , Corona Borealis ranks 73rd of the 88 modern constellations by area . Its position in the Northern Celestial Hemisphere means that the whole constellation is visible to observers north of 50 ° S. It is bordered by Boötes to the north and west , Serpens Caput to the south , and Hercules to the east . The three @-@ letter abbreviation for the constellation , as adopted by the International Astronomical Union in 1922 , is ' CrB ' . The official constellation boundaries , as set by Eugène Delporte in 1930 , are defined by a polygon of eight segments (illustrated in infobox) . In the equatorial coordinate system , the right ascension coordinates of these borders lie between 15h 16.0m and 16h 25.1m , while the declination coordinates are between 39 @.@ 71 ° and 25 @.@ 54 ° . It has a counterpart ? Corona Australis ? in the Southern Celestial Hemisphere .

= = Notable features = =

= = = Stars = = =

The seven stars that make up the constellation 's distinctive crown @-@ shaped pattern are all 4th @-@ magnitude stars except for the brightest of them , Alpha Coronae Borealis . The other six stars are Theta , Beta , Gamma , Delta , Epsilon and Iota Coronae Borealis . The German cartographer Johann Bayer gave twenty stars in Corona Borealis Bayer designations from Alpha to Upsilon in his 1603 star atlas Uranometria . Zeta Coronae Borealis was noted to be a double star by later astronomers and its components designated Zeta1 and Zeta2 . John Flamsteed did likewise with Nu Coronae Borealis ; classed by Bayer as a single star , it was noted to be two close stars by Flamsteed . He named them 20 and 21 Coronae Borealis in his catalogue , alongside the designations Nu1 and Nu2 respectively . Chinese astronomers deemed nine stars to make up the asterism , adding Pi and Rho Coronae Borealis . Within the constellation 's borders , there are 37 stars brighter than or equal to apparent magnitude 6 @.@ 5 .

Also called Alphekka or Gemma , Alpha Coronae Borealis appears as a blue @-@ white star of magnitude 2 @.@ 2 . In fact , it is an Algol @-@ type eclipsing binary that varies by 0 @.@ 1 magnitude with a period of 17 @.@ 4 days . The primary is a white main @-@ sequence star of spectral type A0V that is 2 @.@ 91 times the mass of the Sun (M ?) and 57 times as luminous (L ?) , and is surrounded by a debris disk out to a radius of around 60 astronomical units (AU) . The

secondary companion is a yellow main @-@ sequence star of spectral type G5V that is a little smaller (0 @.@ 9 times) the diameter of the Sun . Lying 75 ± 0 @.@ 5 light @-@ years from Earth , Alphekka is believed to be a member of the Ursa Major Moving Group of stars that have a common motion through space .

Located 112 ± 3 light @-@ years away , Beta Coronae Borealis or Nusakan is a spectroscopic binary system whose two components are separated by 10 AU and orbit each other every 10 @.@ 5 years . The brighter component is a rapidly oscillating Ap star , pulsating with a period of 16 @.@ 2 minutes . Of spectral type A5V with a surface temperature of around 7980 K , it has around 2 @.@ 1 M ? , 2 @.@ 6 solar radii (R ?) , and 25 @.@ 3 L ? . The smaller star is of spectral type F2V with a surface temperature of around 6750 K , and has around 1 @.@ 4 M ? , 1 @.@ 56 R ? , and between 4 and 5 L ? . Near Nusakan is Theta Coronae Borealis , a binary system that shines with a combined magnitude of 4 @.@ 13 located 380 ± 20 light @-@ years distant . The brighter component , Theta Coronae Borealis A , is a blue @-@ white star that spins extremely rapidly ? at a rate of around 393 km per second . A Be star , it is surrounded by a debris disk .

Flanking Alpha to the east is Gamma Coronae Borealis , yet another binary star system , whose components orbit each other every 92 @.@ 94 years and are roughly as far apart from each other as the Sun and Neptune . The brighter component has been classed as a Delta Scuti variable star , though this view is not universal . The components are main sequence stars of spectral types B9V and A3V . Located 170 ± 2 light @-@ years away , 4 @.@ 06 @-@ magnitude Delta Coronae Borealis is a yellow giant star of spectral type G3.5III that is around 2 @.@ 4 M ? and has swollen to 7 @.@ 4 R ? . It has a surface temperature of 5180 K. For most of its existence , Delta Coronae Borealis was a blue @-@ white main @-@ sequence star of spectral type B before it ran out of hydrogen fuel in its core . Its luminosity and spectrum suggest it has just crossed the Hertzsprung gap , having finished burning core hydrogen and just begun burning hydrogen in a shell that surrounds the core .

Zeta Coronae Borealis is a double star with two blue @-@ white components 6 @.@ 3 arcseconds apart that can be readily separated at 100x magnification . The primary is of magnitude 5 @.@ 1 and the secondary is of magnitude 6 @.@ 0 . Nu Coronae Borealis is an optical double , whose components are a similar distance from Earth but have different radial velocities , hence are assumed to be unrelated . The primary , Nu1 Coronae Borealis , is a red giant of spectral type M2III and magnitude 5 @.@ 2 , lying 640 ± 30 light @-@ years distant , and the secondary , Nu2 Coronae Borealis , is an orange @-@ hued giant star of spectral type K5III and magnitude 5 @.@ 4 , estimated to be 590 ± 30 light @-@ years away . Sigma Coronae Borealis , on the other hand , is a true multiple star system divisible by small amateur telescopes . It is actually a complex system composed of two stars around as massive as the Sun that orbit each other every 1 @.@ 14 days , orbited by a third Sun @-@ like star every 726 years . The fourth and fifth components are a binary red dwarf system that is 14 @,@ 000 AU distant from the other three stars . ADS 9731 is an even rarer multiple system in the constellation , composed of six stars , two of which are spectroscopic binaries .

Corona Borealis is home to two remarkable variable stars . T Coronae Borealis is a cataclysmic variable star also known as the Blaze Star . Normally placid around magnitude 10 ? it has a minimum of 10 @.@ 2 and maximum of 9 @.@ 9 ? it brightens to magnitude 2 in a period of hours , caused by a nuclear chain reaction and the subsequent explosion . T Coronae Borealis is one of a handful of stars called recurrent novae , which include T Pyxidis and U Scorpii . An outburst of T Coronae Borealis was first recorded in 1866 ; its second recorded outburst was in February 1946 . T Coronae Borealis is a binary star with a red @-@ hued giant primary and a white dwarf secondary , the two stars orbiting each other over a period of approximately 8 months . R Coronae Borealis is a yellow @-@ hued variable supergiant star , over 7000 light @-@ years from Earth , and prototype of a class of stars known as R Coronae Borealis variables . Normally of magnitude 6 , its brightness periodically drops as low as magnitude 15 and then slowly increases over the next several months . These declines in magnitude come about as dust that has been ejected from the star obscures it . Direct imaging with the Hubble Space Telescope shows extensive dust clouds out to a radius of around 2000 AU from the star , corresponding with a stream of fine dust (composed of grains 5 nm

in diameter) associated with the star 's stellar wind and coarser dust (composed of grains with a diameter of around 0 @.@ 14 µm) ejected periodically .

There are several other variables of reasonable brightness for amateur astronomer to observe , including three Mira @-@ type long period variables : S Coronae Borealis ranges between magnitudes 5 @.@ 8 and 14 @.@ 1 over a period of 360 days . Located around 1946 light @-@ years distant , it shines with a luminosity 16 @,@ 643 times that of the Sun and has a surface temperature of 3033 K. One of the reddest stars in the sky , V Coronae Borealis is a cool star with a surface temperature of 2877 K that shines with a luminosity 102 @,@ 831 times that of the Sun and is a remote 8810 light @-@ years distant from Earth . Varying between magnitudes 6 @.@ 9 and 12 @.@ 6 over a period of 357 days , it is located near the junction of the border of Corona Borealis with Hercules and Bootes . Located 1 @.@ 5 ° northeast of Tau Coronae Borealis , W Coronae Borealis ranges between magnitudes 7 @.@ 8 and 14 @.@ 3 over a period of 238 days . Another red giant , RR Coronae Borealis is a M3 @-@ type semiregular variable star that varies between magnitudes 7 @.@ 3 and 8 @.@ 2 over 60 @.@ 8 days . RS Coronae Borealis is yet another semiregular variable red giant , which ranges between magnitudes 8 @.@ 7 to 11 @.@ 6 over 332 days . It is unusual in that it is a red star with a high proper motion (greater than 50 milliarcseconds a year) . Meanwhile , U Coronae Borealis is an Algol @-@ type eclipsing binary star system whose magnitude varies between 7 @.@ 66 and 8 @.@ 79 over a period of 3 @.@ 45 days

TY Coronae Borealis is a pulsating white dwarf (of ZZ Ceti) type , which is around 70 % as massive as the Sun , yet has only 1 @.@ 1 % of its diameter . Discovered in 1990 , UW Coronae Borealis is a low @-@ mass X @-@ ray binary system composed of a star less massive than the Sun and a neutron star surrounded by an accretion disk that draws material from the companion star . It varies in brightness in an unusually complex manner : the two stars orbit each other every 111 minutes , yet there is another cycle of 112 @.@ 6 minutes , which corresponds to the orbit of the disk around the degenerate star . The beat period of 5 @.@ 5 days indicates the time the accretion disk ? which is asymmetrical ? takes to precess around the star .

= = = Extrasolar planetary systems = = =

Extrasolar planets have been confirmed in five star systems , four of which were found by the radial velocity method . The spectrum of Epsilon Coronae Borealis was analysed for seven years from 2005 to 2012 , revealing a planet around 6 @.@ 7 times as massive as Jupiter (MJ) orbiting every 418 days at an average distance of around 1 @.@ 3 AU . Epsilon itself is a 1 @.@ 7 M ? orange giant of spectral type K2III that has swollen to 21 R ? and 151 L ? . Kappa Coronae Borealis is a spectral type K1IV orange subgiant nearly twice as massive as the Sun ; around it lie a dust debris disk , and one planet with a period of 3 @.@ 4 years . This planet 's mass is estimated at 2 @.@ 5 MJ . The dimensions of the debris disk indicate it is likely there is a second substellar companion . Omicron Coronae Borealis is a K @-@ type clump giant with one confirmed planet with a mass of 0 @.@ 83 MJ that orbits every 187 days ? one of the two least massive planets known around clump giants . HD 145457 is an orange giant of spectral type K0III found to have one planet of 2 @.@ 9 MJ . Discovered by the Doppler method in 2010 , it takes 176 days to complete an orbit . XO @-@ 1 is a magnitude 11 yellow main @-@ sequence star located approximately 560 light @-@ years away , of spectral type G1V with a mass and radius similar to the Sun . In 2006 the hot Jupiter exoplanet XO @-@ 1b was discovered orbiting XO @-@ 1 by the transit method using the XO Telescope . Roughly the size of Jupiter , it completes an orbit around its star every three days .

The discovery of a Jupiter @-@ sized planetary companion was announced in 1997 via analysis of the radial velocity of Rho Coronae Borealis , a yellow main sequence star and Solar twin of spectral type G0V , around 57 light @-@ years distant from Earth . More accurate measurement of data from the Hipparcos satellite subsequently showed it instead to be a low @-@ mass star somewhere between 100 and 200 times the mass of Jupiter . Possible stable planetary orbits in the habitable zone were calculated for the binary star Eta Coronae Borealis , which is composed of two stars ? yellow main sequence stars of spectral type G1V and G3V respectively ? similar in mass and spectrum to the Sun . No planet has been found , but a brown dwarf companion about 63 times as

massive as Jupiter with a spectral type of L8 was discovered at a distance of 3640 AU from the pair in 2001 .

= = = Deep @-@ sky objects = = =

Corona Borealis contains few galaxies observable with amateur telescopes . NGC 6085 and 6086 are a faint spiral and elliptical galaxy respectively close enough to each other to be seen in the same visual field through a telescope . Abell 2142 is a huge (six million light @-@ year diameter) , X @-@ ray luminous galaxy cluster that is the result of an ongoing merger between two galaxy clusters . It has a redshift of 0 @.@ 0909 (meaning it is moving away from us at 27 @,@ 250 km / s) and a visual magnitude of 16 @.@ 0 . It is about 1 @.@ 2 billion light @-@ years away . Another galaxy cluster in the constellation , RX J1532.9 + 3021 , is approximately 3 @.@ 9 billion light @-@ years from Earth . At the cluster 's center is a large elliptical galaxy containing one of the most massive and most powerful supermassive black holes yet discovered . Abell 2065 is a highly concentrated galaxy cluster containing more than 400 members , the brightest of which are 16th magnitude ; the cluster is more than one billion light @-@ years from Earth . On a larger scale still , Abell 2065 , along with Abell 2061 , Abell 2067 , Abell 2079 , Abell 2089 , and Abell 2092 , make up the Corona Borealis Supercluster . Another galaxy cluster , Abell 2162 , is a member of the Hercules Superclusters .

= = Mythology = =

In Greek mythology , Corona Borealis was linked to the legend of Theseus and the minotaur . It was generally considered to represent a crown given by Dionysus to Ariadne , the daughter of Minos of Crete , after she had been abandoned by the Athenian prince Theseus . When she wore the crown at her marriage to Dionysus , he placed it in the heavens to commemorate their wedding . An alternate version has the besotted Dionysus give the crown to Ariadne , who in turn gives it to Theseus after he arrives in Crete to kill the minotaur that the Cretans have demanded tribute from Athens to feed . The hero uses the crown 's light to escape the labyrinth after disposing of the creature , and Dionysus later sets it in the heavens . The Latin author Hyginus linked it to a crown or wreath worn by Bacchus (Dionysus) to disguise his appearance when first approaching Mount Olympus and revealing himself to the gods , having been previously hidden as yet another child of Jupiter 's trysts with a mortal , in this case Semele . In Welsh mythology , it was called Caer Arianrhod , " the Castle of the Silver Circle " , and was the heavenly abode of the Lady Arianrhod . Corona Borealis was one of the 48 constellations mentioned in the Almagest of classical astronomer Ptolemy .

The Arabs called the constellation Alphecca (a name later given to Alpha Coronae Borealis) , which means " separated " or " broken up " (????? al @-@ Fakkah) , a reference to the resemblance of the stars of Corona Borealis to a loose string of jewels . This was also interpreted as a broken dish . Among the Bedouins , the constellation was known as qa??at al @-@ mas?k?n (???? ????????) , or " the dish / bowl of the poor people " .

The Skidi people of Native Americans saw the stars of Corona Borealis representing a council of stars whose chief was Polaris . The constellation also symbolised the smokehole over a fireplace , which conveyed their messages to the gods , as well as how chiefs should come together to consider matters of importance . The Shawnee people saw the stars as the Heavenly Sisters , who descended from the sky every night to dance on earth . Alphecca signifies the youngest and most comely sister , who was seized by a hunter who transformed into a field mouse to get close to her . They married though she later returned to the sky , with her heartbroken husband and son following later . The Mi 'kmaq of eastern Canada saw Corona Borealis as Mskegw?m , the den of the celestial bear (Alpha , Beta , Gamma and Delta Ursae Majoris) .

Polynesian peoples often recognized Corona Borealis ; the people of the Tuamotus named it Na Kaua @-@ ki @-@ tokerau and probably Te Hetu . The constellation was likely called Kaua @-@ mea in Hawaii , Rangawhenua in New Zealand , and Te Wale @-@ o @-@ Awitu in the Cook

Islands atoll of Pukapuka . Its name in Tonga was uncertain ; it was either called Ao @-@ o @-@ Uvea or Kau @-@ kupenga .

In Australian Aboriginal astronomy , the constellation is called womera (" the boomerang ") due to the shape of the stars . The Wailwun people of northwestern New South Wales saw Corona Borealis as mullion wollai " eagle 's nest " , with Altair and Vega ? each called mullion ? the pair of eagles accompanying it . The Wardaman people of northern Australia held the constellation to be a gathering point for Men 's Law , Women 's Law and Law of both sexes come together and consider matters of existence .

= = = Later references = = =

Corona Borealis was renamed Corona Firmiana in honour of the Archbishop of Salzburg in the 1730 Atlas Mercurii Philosophicii Firmamentum Firminianum Descriptionem by Corbinianus Thomas , but this was not taken up by subsequent cartographers . The constellation was featured as a main plot ingredient in the short story " Hypnos " by H. P. Lovecraft , published in 1923 ; it is the object of fear of one of the protagonists in the novella . Finnish band Cadacross released an album titled Corona Borealis in 2002 .