

## HISTORY OF VARIABLE STAR NOMENCLATURE

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Received 1 November 1987

### Abstract

This paper seeks to elucidate when and where between 1844 and 1850 Argelander first proposed his system of variable star nomenclature. After the letters R through Z were nearly exhausted in a few constellations, numerous further schemes were suggested. Here only the ones accepted, first by the Astronomische Gesellschaft and later by the International Astronomical Union, are discussed. Examples of possible confusions between the Argelander designations and the same names earlier assigned to other stars, especially by Lacaille in 1763, not previously cited elsewhere, are given.

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It is common knowledge that F. W. A. Argeländer (1799-1875) first inaugurated the system of naming variable stars by the letters R through Z followed by the name of the constellation in which a variable was discovered (e.g., R And). Exactly when between 1844 and 1850 he first proposed this scheme is obscure. In 1844 he (Argeländer 1844) published a list of 18 periodic variables in which these letters were not used. In 1850 Humboldt published a table attributed to Argelander of 24 periodical variables of which eight were called R and two S, but with the constellation name unabbreviated following the capital letters. This is generally quoted as the first appearance of the letter designations. Humboldt does not elaborate on the system of naming. In Argeländer's *Uranometria Nova*, published in 1843, three of those called R on the 1850 list are labelled var on the atlas charts, but none is designated R or S. Of all the references to Argeländer in Houzeau and Lancaster (1882) or in Poggendorff (1863-1898) the only one that comments on the naming of variables relates specifically only to R Vir, discovered by Harding in 1809 and named R Virginis by Argeländer in 1855. He comments "Dass ich einen nicht bei Bayer verkommenden Stern mit einem Buchstaben bezeichne, wird mir hoffentlich nicht verdacht werden." (He hopes he will be forgiven for designating by a letter a star that does not occur in the Bayer atlas.) He states that the nova P Cygni is the only star for which Bayer used a capital letter other than A. (In fact, Bayer also used B, for Tycho's nova, B Cas.)

Loosely, it has been stated that Argeländer started with R because earlier letters of the alphabet, particularly P for the nova P Cygni, had already been usurped for bright stars in the various constellations, although only B for B Cas (Tycho's nova) and P Cygni had been named specifically for novae, stars which Argeländer, however, considered as a special class and did not include in his early lists of variables. Asimov (1982) stated that Argeländer "introduced the modern system of naming them [the variable stars], using letter prefixes beginning with the letter R for rot ("red") because so many variable stars are red." (I have found no verification of this statement, and Asimov was unable to supply a reference.)

Although Argeländer's choice of notation worked out fairly well in the long run, with its subsequent expansion to double letters (Hartwig 1881) and ultimately to V numbers (Fowler 1925; Shapley 1928), it was not altogether a happy choice, as he seemed to have ignored the use of

Latin capital letters by Lacaille, whose Greek letters he had accepted for those southern stars not previously labelled by Bayer. In general, if a star which turned out to be variable had already been assigned a Greek letter designation it was to retain that name and not be assigned a new variable star designation. Both Bayer and Lacaille used Latin letters for the naked eye stars if the Greek alphabet did not suffice in either a crowded or a large constellation. With the exception of P Cyg and B Cas, Bayer used only capital A and lower case letters b through z. He did not use lower case a because it could too easily be confused with alpha. However, Bayer did not letter the stars in the far southern constellations; and his original constellation Argo Navis was too large to be wieldy. In 1750-54 Nicolas Louis de Lacaille travelled to the Cape of Good Hope where he observed these stars and set up his own lettering system, more or less following Bayer's scheme. Argo he subdivided into four constellations, Carina, Puppis, Pyxis, and Vela. He retained the Greek letters assigned by Bayer in three of these, (in Pyxis there were no Bayer Greek letters so he named the brightest stars there from alpha through lambda) with the result that each of the three constellations is deficient in the Greek letters occurring in any of the others. However, only two of these stars (eta Car and rho Vel) proved to be variable. Lacaille (1763; 1847), unlike Bayer, used both upper and lower case A and a as well as all the other capital Roman letters with the exception of J and U.

Although Francis Baily (1845) used both the Bayer and Lacaille letters in his "British Association Catalogue," following recommendations of Sir John Herschel, Baily nevertheless advocated that the Greek letters henceforth be used only for stars brighter than 5th magnitude.

E. C. Pickering in Harvard Annals 50 (known as the HR Catalogue, for "Harvard Revised Photometry") adopted Latin letters from Bayer and Lacaille except for Lacaille's capital R through Z. Two stars, P and Q Cyg, are novae or supernovae, as Pickering also accepted Lacaille's P or Q for several southern stars which were neither novae nor variable: Q Car, Q Cen, P Hya, P and Q Pup, Q Sco, and Q Vel. All the capital letters R - Z that Pickering adopted agree with the modern variable star designations, with but one exception, R Pyx (HR 3534) at  $8^{\text{h}} 48^{\text{m}} 36^{\text{s}} - 36^{\circ} 10'$  (NSV 4288). This was called R in the Astrographic Catalogue, whereas the variable R Pyx is a faint star at  $8^{\text{h}} 41^{\text{m}} 3 - 27^{\circ} 50' 2''$ . (In his Remarks in the HR catalogue Pickering himself pointed out the discrepancy but in his catalogue proper he unfortunately assigned the letter to the bright non-variable.) For nearly all the variables designated R through Z in Pickering's catalogue Lacaille's catalogues give the same designations to different stars.

In view of Argeländer's proposal to assign the letters R through Z to newly discovered variables it is of interest to examine some of the discordances between the new variable star designations and the stars that had already been assigned the same letters in earlier catalogues or atlases. Table I gives a sampling. The first line for each designation gives the date of discovery and 1900 position of the variable, followed by the positions and identifications of the other stars that had previously been given the same names, and finally a few comments. Also included in the Table is N Vel, named by Lacaille in 1763 and discovered to be variable by Gould in 1871. It is noted that sometimes the letter N has been assigned to novae, followed by a serial number if more than one Nova has occurred in a given constellation. But N Vel is not a nova. It is a star of small amplitude, reported by Gould as varying from 3.4 to 4.2v, but with a modern photoelectric amplitude of only 0.06V. Table I suggests that prior to the twentieth century the use of the same letters for both a variable and another non-variable star could have caused confusion. Fortunately, the use of these letters for the non-variable has been abandoned in modern catalogues (except that the variable star names have been retained for

the named suspected variables that later proved to be non-variable, namely, those noted as *cst* in the **General Catalogue of Variable Stars** (Kukarkin *et al.*) (GCVS), of which 44 in the 1971 edition have the choice names R through Z).

Following the example of Schlesinger (Schlesinger and Pond 1925), who tabulated ten variables with unusual designations, a similar list is compiled in Table II, giving the year of discovery of variability and the name of the person who originally named the star.

With the exception of the nova Q Cyg all of these stars had letters assigned long before a system of nomenclature especially for variable stars had been established. The source of Q for Q Cyg (discovered in 1876) is obscure, possibly assigned just to follow P without reference to Argeländer. In Chandler's first catalogue of variable stars published in 1888 this variable was included but not yet named. Similarly it remained unnamed in Pickering's "Index to Observations of Variable Stars" published in 1890. But in Chandler's second catalogue in 1893, it had been named Q Cyg. No comment on the unusual letter was offered, the introduction simply stating "the letters according to Argeländer's system of nomenclature, extended by the use of double letters, require no special remark." Yet no provision for Q seems to have been stated by Argeländer or elsewhere.

By 1867 the Astronomische Gesellschaft (the "A.G.", founded by Argeländer in 1863) was aware that a clearing house for naming the variables was essential (Schonfeld 1867). For one thing, the boundaries of the constellations were not well defined, and for another, individual observers took it upon themselves to name the variables they had discovered, without recourse to the discoveries of others, sometimes resulting in ambiguity. The intention had been for the letters to be assigned chronologically, not necessarily in the order of actual discovery, but rather more conservatively in the order of verification. Thus it came about that letters were assigned not strictly in the order intended by Argeländer. Hence it was proposed that the onus of assigning names be reserved by the A.G. itself and that a catalogue be prepared of the accepted designations. At its 1868 meeting Schonfeld and Winnecke pointed out a number of discordances in the arrangement of the letters, but agreed that a revision to strict adherence to the system would only result in greater confusion. The boundaries of the constellations were to be as indicated in Argeländer's *Uranometris Nova* (1843). The Schonfeld and Winnecke catalogue of 126 stars, including P Cyg but no other novae, listed variables only north of  $-30^\circ$ , except for eta Carina, which was still called eta Argo, and listed as irregular (not nova). Reasons were given for rejecting four suspected variables now named SZ Boo (an RR Lyr type), NSV 276, NSV 657, and NSV 4496= $\alpha$  Hya. The mal-assignment of several letters was noted: S Cap and R Del were found to be non-variable; T Peg had been assigned although S Peg (discovered 1871) had not yet been; U, V, W, and X Sgr were not chronologically in correct order; and finally W Vir had been assigned prematurely by Chambers in 1865 to a suspected Hind variable, a different star from the one Schonfeld discovered and named W Vir in 1866. (Hind's has not been included in the modern catalogues of suspected variable stars, the NSV or its predecessors.)

By 1881 the nine letters recommended by Argeländer were already exhausted in some constellations and Hartwig suggested using the double letters RR, RS, . . . ., RZ, SS, ST, . . . ., ZZ, thus adding 45 more possible names. Again, by 1904 these, too, were exhausted in some constellations. Now, upon the recommendation of F. W. Ristenpart (Duner, Hartwig, and Muller 1907), the double letters AA, . . . AZ, BB, . . . , QZ were added, making a total of 334 possible names in each constellation, not counting the variables that already had Bayer or Lacaille designations, and all use of the letter J being excluded (to

avoid confusion with I). Finally by the time of the 1925 IAU meeting in England it was suggested that further discoveries in each constellation be numbered sequentially starting with V335, thus eliminating the need for any future reform of the system (Fowler 1925; Shapley 1928).

A number of other suggestions had been proposed for changing or extending the Argeländer system. (See, for example, Hagen 1913; Ludendorff 1928; Townley 1915.) Some had advocated changing all the letter designations also to V numbers starting with V1 for R through V334 for QZ. However, the concensus was that these names had been too firmly established for profitable change. In accordance with Argeländer's precedence most novae were not included in the scheme of naming variables. They were usually simply listed by constellation and year, e.g. Nova Ari 1854, or N Ari 1854. Some, however, had already been assigned regular variable star designations; perhaps their nature was not yet appreciated at the time of their naming. These designations were not changed. Finally the IAU recommended that all novae be given variable star designations, and this was first done in 1950 (Kukarkin *et al.* 1950). With this decision the original precept of naming the variables strictly in order of the time of their confirmation as variable was finally clearly disrupted.

By 1982 some 28450 variable stars had been named, and by 1980 14810 objects were listed in the NSV, the **New Catalogue of Suspected Variables** (Kholopov *et al.* 1982), a really remarkable advance over Argeländer's 1850 catalogue of only 24 confirmed variable stars at a time when 139 already discovered novae (Hoffleit 1986) were not considered as variable stars.

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TABLE I

A Sample of Early Discordant Designations  
 (of Letters Used Before 1850)

Name	Var.	Discovered at or by	RA (1900)	Dec (1900)	Notes
R And	1859	Bonn	00 <sup>h</sup> 18 <sup>m</sup> 44 <sup>s</sup> .8	+ 38 <sup>o</sup> 01' 25"	
51R <sup>2</sup> And	1843	Rumker	01 31 50.0	+ 48 07 26	
RR And	1901	Anderson	00 45 57	+ 33 50.0	1
R Car	1871	Gould	09 29 43.6	- 62 20 46	
R Car	1763	Lacaille	07 23 48	- 50 49 38	2
R Cen	1871	Gould	14 09 21.8	- 59 26 52	
R Cen	1763	Lacaille	14 03 20	- 52 57 38	3
V Cen	1894	Roberts	14 25 22.8	- 56 26 39	
V Cen	1763	Lacaille	14 13 24	- 55 54 59	4
Z Cen	1895	(NOVA)	13 14 12.8	- 59 14 49	
Z Cen	1763	Lacaille	13 15 56	- 60 28 45	
Z Gem	1903	Graff	07 01 36	+ 22 41.0	
53Z Gem	1843	Rumker	07 09 42	+ 28 04 17	5
Z Leo	1907	Leavitt	09 46 24	+ 27 22.5	
43Z Leo	1843	Rumker	10 17 46	+ 07 41 31	6
R Pup	1879	Gould	07 36 59.8	- 31 25 41	
R Pup	1763	Lacaille	07 50 24	- 47 51 06	7
T Pup	1879	Gould	07 44 43.4	- 40 24 08	
T Pup	1763	Lacaille	07 39 55	- 44 54 05	8
Z Pup	1897	Perry	07 28 17	- 20 26.7	
Z Pup	1763	Lacaille	06 27 24	- 50 09 56	9
Z Pup	1908	Pickering	07 30.2	- 36 09	10
R Sgr	1858	Pogson	19 10	- 19 29.0	
R Sgr	1763	Lacaille	20 08 50	- 28 11 38	11
N Vel	1871	Gould	09 28 11	- 56 35.6	
N Vel	1763	Lacaille	09 28 12	- 56 36 03	12
R Vel	1879	Gould	10 02 23	- 51 42 04	
R Vel	1763	Lacaille	10 09 32	- 50 44 14	13
T Vel	1892	Roberts	08 34 26	- 47 00.7	
T Vel	1763	Lacaille	10 17 13	- 55 32 00	14
Z Vel	1900	Innes	09 49 25	- 53 42.5	
Z Vel	1763	Lacaille	10 42 57	- 56 13 06	15

Notes to Table I:

1. Rumker's position identifies with 51 And in **BAC** (1845), **HR** (1907), **BS** (1982), in none of which it is called R or RR. Heis atlas (1872) shows the variable, R And, and the position agrees with **Ann. Bureau d. Longitudes** (1889). The reason for Rumker's exponent ( $R^2$ ) is obscure. It is not a double star. In 1889 **The Annuaire**, Bur. d. Longitudes adopted  $R^2$  for the stars currently named RR Cyg and RR Vir, but no  $R^2$  And. Current RR And is different from both R and 51 And.
2. This also corresponds to R in **Paramatta** (1835) and **BAC** (1845).
3. The Lacaille star is also called R in **Paramatta** (1835); it is in **BAC** (1845) but not called R.
4. Also in **Paramatta** (1835). Same star in **BAC** (1845) but not called R.
5. **BAC** (1845), Auwers (1888), and **HR** (1908) call this 53 Gem but not Z Gem.
6. **BAC** (1845), Auwers (1888), **HR** (1908), and **BS** (all ed.) call this 43 Leo but not Z Leo.
7. Also R in **Mem. Roy. Astron. Soc.**, 2, (1825), 5, (1831), **Paramatta** (1835), and **BAC** (1845). Gould's variable, however, is cst.
8. Also T in **Paramatta** (1835), **BAC** (1845).
9. Also Z Pup in **BAC** (1845).
10. In **HA 50** (1908), **HR** 2911 is called Z, but this should have been Z Pup.  
It is the same as Z Pup in **BAC**. Although this is not the variable Z Pup, it too is a variable, OW Pup, discovered photoelectrically at the Cape in 1961. (**Cape Mimeograms**, No. 12, 1961.)
11. Also R in **Mem. Roy. Astron. Soc.**, 2 (1825), 5 (1831). In **BAC** but not called R.
12. Also N in **Mem. Roy. Astron. Soc.** 2 (1825), 5 (1831), **BAC** (1845), **HA 50** (1908). This is the same star, but it is not a nova.
13. Also R in **Paramatta** (1835), **BAC** (1845). The variability of Gould's star is not confirmed.
14. Also T in **Mem. Roy. Astron. Soc.** 2 (1825), 5 (1831), **Paramatta** (1935) and **BAC** (1845).
15. Also Z in **Paramatta** (1835), **BAC** (1845).

TABLE II

Extraordinary Designations

Name	Discovered		Type	Named by	Fl. No.
	Year	by			
i Boo	1824	Herschel	EW/KW	Bayer	44
l Car	1871	Gould	D Cep	Lacaille	--
B Cas	1572	Tycho	SN	Bayer	--
P Cyg	1600	Blaeu	N	Bayer	34
Q Cyg	1876	Schmidt	Na	Chandler	--
g Her	1857	Baxendell	SRb	Bayer	30
u Her	1869	Schmidt	EA/SD	Bayer	68
b Per	1920	Stebbins	E11	Bayer	--
L <sub>2</sub> Pup	1872	Gould	SRb	Lacaille	--
d Ser	1894	Yendell	?	Bayer	59
N Vel	1871	Gould	L?	Lacaille	--