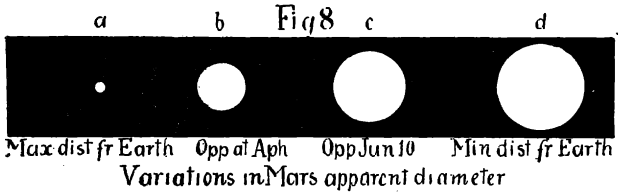
Fig. 8. The apparent diameter of Mars changes rapidly as the planet approaches, or recedes from the earth. If it were at its maximum possible distance, and if the sun were out of the way, its diameter would be represented by the circle *a*. If an opposition should occur when Mars were at or near aphelion its diameter would be represented at *b*; *c* shows the diameter at the opposition of June 10; and *d* its maximum possible diameter when the planet is at opposition, and at the same time at or near perihelion.



In order to familiarize himself with the positions of the planets in conjunction, and of conjunction with the sun, the student should plot the orbits of Venus and Mercury by the reduced scale, and show the positions of the earth and the planets at one or more of the following dates: Feb. 24, Venus and Uranus; Feb. 28, Uranus with the sun; Mar. 25, Mercury and Uranus; June 30, Venus and Neptune; Aug 7, Mercury and Neptune; Aug. 8, Neptune with the sun; Aug. 15, Venus and Saturn; Aug. 26, Venus and Jupiter; Sept. 8, Mercury and Saturn; Sept. 21, Mercury and Jupiter; Oct. 4, Saturn with the sun; Oct. 8, Mercury and Jupiter; Oct. 23, Jupiter with the sun; Nov. 10, Mercury and Jupiter; and Dec. 24, Mars and Uranus.

In each case the direction in which the more distant planet is seen from the earth at the given date will be shown by the line connecting the earth with the nearer planet.

THE NEW INTERNATIONAL SYMBOLS FOR THE CONSTELLATIONS.

By HENRY NORRIS RUSSELL.

For almost a century chemists have had a distinct advantage over astronomers with respect to convenience of expression. The long Latin names of the elements in chemical literature are usually replaced by brief symbols familiar to everyone; but the long Latin names of the constellations have been printed in full (or somewhat curtailed) thousands upon thousands of times, in astronomical publications, when similar abbreviations would have answered every purpose. The aggregate cost of the extra printing involved must have been very considerable, and there is no reason for the continuance of this needless expense, especially in the present day of high prices.

The first astronomer to appreciate the importance of such abbreviations was Hertzsprung, who, in a recent publication,* has suggested a very compact system of symbols, composed of two letters each. From the standpoint of brevity and economy his symbols leave nothing to be desired. But they are open to certain objections.

In the first place, many of them are identical with the established symbols of the chemical elements. There is little danger that astronomers would be confused by this; but the ambiguity is undesirable.† and should be avoided in designing a new system. Moreover, symbols of two letters must necessarily be somewhat arbitrary (especially as the names of twenty-two constellations begin with C), but it is desirable that the symbols should suggest the constellations at a glance.

Symbols composed of three letters remove the first objection, and greatly reduce the second. An experimental list prepared by the writer was discussed with other astronomers on the voyage to Europe and at informal after-dinner meetings in Rome. The list, improved by various people, was then tried out on sundry others of different nationality, and appeared to be interpretable almost at first reading. It was then presented, along with Professor Hertzsprung's, at a meeting of the Committee on Units and Notation. A large majority favored the use of three letters, and a set of such symbols was recommended by the Committee and adopted at a plenary session of the International Astronomical Union.

No one is thereby placed under any obligation to use the new symbols, but it is hoped that their voluntary adoption may save a good deal of time and money, especially in tabulation.

It should be emphasized that they are symbols rather than abbreviations and not intended to be pronounced as separate words, but to be read as the Latin names (in the nominative or genitive as the syntax demands).

Before giving the list, a few words may be said regarding the principles on which they are formed. In most cases, the first three letters of the name suffice and are free from ambiguity. When these are the same for two or more constellations (as in Aquila and Aquarius) the initial letter and two other distinctive ones are employed. If the name consists of two words (e. g. Ursa Major) the two initials are capitalized and one other letter added.

These simple rules suffice for all cases. The most troublesome pair were Sagitta and Sagittarius, where distinctive letters could be found only by taking the genitive forms. The genitives are again suggested

*Annals of the Observatory of Leiden.

†A similar difficulty, involving notations already established, has been alleviated by the recommendation (adopted at the Rome meeting) that the letters denoting the Fraunhofer lines be printed in parentheses, those denoting spectral classes as Roman capitals, and the chemical symbols in Italics in astronomical literature, e. g. "The (B) group is not due to *B* nor characteristic of Class B."

in Hydra and Hydrus. The lady's name has been omitted from Coma Berenices (as is now customary). The other cases need no comment. The reader may amuse himself by covering up the Latin names in the table given below and trying how many of the symbols he can interpret at first glance.

INTERNATIONAL SYMBOLS FOR THE CONSTELLATIONS.

And	Andromeda	Lac	Lacerta
Ant	Antlia	Leo	Leo
Aps	Apus	Lep	Lepus
Aql	Aquila	Lib	Libra
Aqr	Aquarius	LMi	Leo Minor
Ara	Ara	Lup	Lupus
Arg	Argo	Lyn	Lynx
Ari	Aries	Lyr	Lyra
Aur	Auriga	Men	Mensa
Boo	Bootes	Mic	Microscopium
Cae	Caelum	Mon	Monoceros
Cam	Camelopardalis	Mus	Musca
Cap	Capricornus	Nor	Norma
Car	Carina	Oct	Octans
Cas	Cassiopeia	Oph	Ophiuchus
Cen	Centaurus	Ori	Orion
Cep	Cepheus	Pav	Pavo
Cet	Cetus	Peg	Pegasus
Cha	Chamaeleon	Per	Perseus
Cir	Circinus	Phe	Phoenix
CMa	Canis Major	Pic	Pictor
CMi	Canis Minor	PsA	Piscis Austrinus
Cnc	Cancer	Psc	Pisces
Col	Columba	Pup	Puppis
Com	Coma Berenices	Pyx	Pyxis
CrA	Corona Australis	Ret	Reticulum
CrB	Corona Borealis	Sae	Sagitta
Crt	Crater	Scl	Sculptor
Cru	Crux	Sco	Scorpius
Crv	Corvus	Sct	Scutum
CVe	Canes Venatici	Ser	Serpens
Cyg	Cygnus	Sex	Sextans
Del	Delphinus	Sgr	Sagittarius
Dor	Dorado	Tau	Taurus
Dra	Draco	Tel	Telescopium
Equ	Equuleus	TrA	Triangulum Australe
Eri	Eridanus	Tri	Triangulum
For	Fornax	Tuc	Tucana
Gem	Gemini	UMa	Ursa Major
Gru	Grus	UMi	Ursa Minor
Her	Hercules	Vel	Vela
Hor	Horologium	Vir	Virgo
Hya	Hydra	Vol	Volans
Hyi	Hydrus	Vul	Vulpecula
Ind	Indus		

In conclusion it should be emphasized that the credit for the suggestion of such symbols belongs entirely to Professor Hertzsprung—to whom astronomers will be increasingly indebted as they contemplate their reduced bills for printing.

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