III. On the Mass Ratio of Spectroscopic Binaries with One Spectrum Visible[1].

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The circumstance that the orbital planes in a multiple system are very likely to coincide (at least approximately), as appears probable from the preceding note, provides us with a new method of determining the mass ratios of spectroscopic binaries with one spectrum, if both the spectroscopic and the visual orbits of a complex system are calculated.

The mass function

$$f = \frac{m_2^3 \sin^3 i}{(m_1 + m_2)^2} \quad \ldots \ldots \ldots \ldots \quad (1)$$

may be written as

$$\frac{(1+k_1)^2}{k_1^3} = \frac{m_1 \sin^3 i}{f} \quad \ldots \ldots \ldots \quad (2),$$

where $k_1 = \frac{m_2}{m_1}$ is the mass ratio to be determined. Assuming for i the inclination of the visual orbit, and determining the mass of the primary (m_1) from the empirical mass-luminosity relation, we get the mass ratio. The results of this computation are given in Table I, where all complex systems with known spectroscopic (all with one spectrum visible) and visual orbits are collected.

The successive columns give: (1) the name of the star; (2) the inclination of the visual orbit (W. Finsen, *Union Obs. Circ.* No. 91); (3) the mass function of the spectroscopic orbit (J. Moore, Fourth Catalogue of Spectroscopic Binaries); (4) the spectrum (J. Moore, *loc. cit.*); (5) the bolometric absolute magni-

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tude deduced from the visual abs. magnitude (from Beer's list in *Ver. Berl. Bab.* **5.** 6) by the usual bolometric corrections; (6) the logarithm of the mass of the primary obtained from an empirical mass-luminosity relation (cf. the first note in this number); (7) the mass ratio, computed from formula (2).

Table I.

Mass Ratios (k_1) of Spectroscopic Binaries with one Spectrum Visible.

Star	i	f	Sp.	M_B	Log m_1	k_1
13 Cet	52°	0.0108	F7	4.2	0.048	0.33
OΣ 82	136	.0193	F8	3.9	.072	.47
μ Ori	110	.0113	A2	1.7	.258	.23
α^1 Gem	115	.00150	A2	1.0	.317	.11
α^2 Gem	115	.0097	A2	1.9	.240	.23
ξ UMa B	123	.000053	Go	5.2	—.036	.05
ξ UMa A	123	.0214	Go	4.7	.000	.38
$\varkappa$ Peg	102°	0.045	F2	2.6	0.182	0.39

The average mass ratio of the spectroscopic binaries with one spectrum visible, calculated from the data in column 7 of Table I, is 0.27, with an individual dispersion of $\pm$0.13. According to the mass-luminosity relation, established in this publication, the corresponding difference in magnitude between the two components is $\Delta m = 4.5$, being thus much larger than suggested by many authors as an average for invisible components of spectroscopic binaries. Thus, we arrive at the important practical conclusion that, in order to obtain the magnitude of the primary, no correction need be added to the combined magnitude of spectroscopic binaries with one spectrum visible; without doubt, the correction hitherto used by many authors, 0.3 mag., must be regarded as too large.

Tartu, May 21, 1937.