$$a' M^{(3)} = m' (1.514047) + 2.856402 + 0.912453 + 0.055738 + 0.003065) = m' (5.341705),$$
$$a' M^{(4)} = -m' (1.470737 + 1.160260 + 0.123996 + 0.017279 + 0.000655) = -m' (2.772927);$$

d'où

$$\log \frac{a' M^{(0)}}{m'} = \bar{2}.9385347 -, \quad \frac{a' M^{(1)}}{m'} = \bar{1}.9406475, \quad \frac{a' M^{(2)}}{m'} = 0.5164152 -, \quad \frac{a' M^{(3)}}{m'} 0.7276799, \quad \frac{a' M^{(4)}}{m'} = 0.4429384 - .$$

Maintenant, on a d'après W. S. Jacob (Mémoirs of the Royal astronomical Society vol. 28), pour l'époque 1858.0

$$e = 0.027937 \qquad e' = 0.028443$$
$$\omega = 257^0 6' 9'' \qquad \omega' = 349^0 20'' 0$$

ce qui donne, en prenant $m' = \frac{1}{200}$ et réduisant en secondes,

$\log a' M^{(0)} e^4$	$= \bar{5}.7366490 -$	$0''.0000545$
$a' M^{(1)} e^3 e'$	$= \bar{4}.7465574$	0.0005579
$a' M^{(2)} e^2 e'^2$	$= \bar{3}.3301207 -$	0.0021385
$a' M^{(3)} e e'^3$	$= \bar{3}.5491810$	0.0035415
$a' M^{(4)} e'^4$	$= \bar{3}.2722351 -$	0.0018717

On a d'ailleurs, T et T' désignant les durées sidérales de Titan et de Japhet,

$$T = 15^j 9453, \qquad T' = 79^j 3296;$$

d'où résulte

n	$= 29686741''.3$	$\log n$	$= 7.4725625$
n'	$= 5967052.7$	$\log n'$	$= 6.7757599$
$5n' - n$	$= 148522.2$	$\log (5n' - n)$	$= 5.1717913$
$\log n^2$	$= 4.9451250$	$\log (5n' - n)^2$	$= 10.3435825,$

en sorte que

$$\log \frac{3 n^2 a}{(5n' - n)^2} = 4.6146180;$$

et si à ces nombres, on associe les suivants:

Angle	log sin	log cos
4ω	$\bar{1}.8940861 -$	$\bar{1}.7932906$
$3\omega + \omega'$	$\bar{1}.8137912$	$\bar{1}.8801316$
$2\omega + 2\omega'$	$\bar{1}.8650325$	$\bar{1}.8327379$
$3\omega' + \omega$	$\bar{1}.8502605 -$	$\bar{1}.8487067$
$4\omega'$	$\bar{1}.8310580 -$	$\bar{1}.8664699$

on obtient enfin

$$\delta \varrho = 129''.5 \sin [(5l' - l) + 130^0 13' 48''].$$

C'est la valeur numérique de la partie de $\delta \varrho$ qui provient des excentricités, et dans le cas où la masse du satellite perturbateur serait égale à la deux-centième partie de la masse de Saturne, comme le suppose Laplace au livre VI de la Mécanique céleste. En prenant pour m' une masse cinquante fois plus faible, c'est-à-dire en posant $m' = \frac{1}{10000}$, on aurait

$$\delta \varrho = 2''.6 \sin [(5l' - l) + 130^0 13' 48''];$$

et l'on voit que pour cette valeur de m' qu'il y a tout lieu de croire au dessous de la véritable, la perturbation du moyen mouvement est encore fort sensible. D'autres rapports de commensurabilité existent entre les moyens mouvements des satellites Rhéa et Titan, Dioné et Encelade, Thétis et Mimas, mais les inégalités auxquelles ces rapports donnent naissance sont loin d'avoir l'importance de celle que nous venons de considérer. Par exemple, l'inégalité qui existe dans les moyens mouvements n et n' de Rhéa et de Titan, et qui dépend de l'angle $7n' - 2n$, est insensible, tant que l'on n'adopte pas pour la masse de Titan une valeur supérieure à $\frac{1}{1000}$; et il faut réduire à $\frac{1}{500}$ la valeur de cette masse pour avoir seulement $K = 0''.10$, comme nous l'avons reconnu par le calcul complet des termes de cette inégalité.

Schreiben des Herrn Prof. Watson an den Herausgeber.

I have just read Dr. C. H. F. Peters' paper in the Astr. Nachr. Nr. 2253, and while I have not the leisure at present to notice fully his criticisms, I must not delay to protest against his misstatement of the facts connected with my observations.

He says that my method was devised by the skillfull hands of Prof. Henry Draper. This is wholly untrue and I must express astonishment that Dr. Peters should make any such statement. I claim no special merit for the method which I employed, but such as it may have belongs wholly to me. I am sure that Dr. Draper had not given the matter any thought whatever, since his attention was directed to an entirely different class of observations. And when I showed it to him, in the presence of Mr. Edison, the night before the eclipse, he expressed his approval saying it was a „good

dodge", but he never once intimated that he had thought of anything of the kind.

Dr. Peters says that my pointers were of flexible telegraph wire filed to a point, and so elastic as to give way several degrees under the touch by a pencil. This statement like that above mentioned, is wholly untrue, and it seems to me the grossest of unfairness to attempt to discredit an observation made by an experienced observer by deliberately misrepresenting the circumstances of the observations. The pointers were made of unannealed brass wire one eighth of an inch in thickness, and they were not filed to a point but to a knife edge, which for each circle, before the obvervations, was placed vertical to the plane of the circle. They were not flexible as Peters declares but were quite rigid, and they could not be disturbed in the least, by the pencil when marking.

His brief statement that I admitted that the star (*b*) was ζ Cancri is unfair as any one will see who will take the trouble to read what I have published in reference to these observations. As to the probable errors of the observations, made in this way, which he figures out, I must be permitted to say that they are absurd, and must have been devised for a purpose. Any one who feels interested may, by a few experiments, find that it is possible to measure by the method which I employed, so that the probable error will not exceed 2′. The limit of 5′ which I gave was an outside limit.

Again, Peters complains that I did not compare the star (*a*) directly with θ Cancri. I beg to say in reply that no one can know better than he that no measurement of this kind could be made without a micrometer, and that my method of observation, in this instance, did not involve the use of a micrometer. If I could have known beforehand that a new star would be seen near θ Cancri, then I could have prepared myself for such an observation as he thinks should have been made; but since I had not any such guide, I adopted a different method, and one which I would use again if I were to attempt observations of this kind.

His statement that my circles „were of wood, with paper scales pasted on to them and wires serving as pointers" shows conclusively that he either does not yet understand the method which I adopted, or else that he is purposely misstating the circumstances of the observations.

Professor Peters' whole attack upon the integrity of my observations is not of the slightest consequence, since he has created the errors in his own brain and has then produced to assail them. I do not intend to engage in any controversy about these matters and especially with a person who was, at the time of the observations, more than two thousand miles away from the place where the eclipse was observed. I repeat here the emphatic declarations:

1. I observed, during the total eclipse of July 29th 1878, a new star between θ Cancri and the sun, and south of the sun, whose position and magnitude were as already published by me.

2. I observed another star, which I believe to be a new star, whose magnitude and position were as already published by me.

I do not propose to discuss the integrity of my observations pointing to the existence of intra-mercurial planets with either Dr. Peters or Mr. Flammarion, both known enemies, and assailants of the late, illustrious Le Verrier who first found that such planets must exist. I have been engaged in making astronomical observations, observations of precision, for twenty three years, and being fully cognizant of every circumstance connected with the observations in question, and having observed with deliberation and with care, (this being the third total eclipse of the sun which I have observed) it matters not to me what these men think or what motives prompt their action, I know whereof I affirm. Whether or not the two new objects which I observed were intra-mercurial planets I cannot positively assert; but I certainly have the right to express my honest belief that they are. I hope to be able to give, ere long, good reasons for the faith that is in me.

I am about to change my residence to Madison, Wisconsin, to undertake tho duties of Director of the new Observatory erected and equipped by Ex-Governor Cadwallader C. Washburn, and until I am settled in my new home I cannot give further attention to these questions. I shall take pleasure before long in giving to the readers of the Astr. Nachrichten an account of the munificent gift to science made by Mr. Washburn. It is indeed with regret that I have felt obliged to sever the pleasant relations which I have formed here, where I have worked so many years; but the opportunities for astronomical work and for prompt publication of the complete observations will be at Madison such that I could not very well hesitate. The State of Wisconsin has provided liberally for the perpetual maintenance of the new Washburn Observatory.

I shall take up my permanent residence at Madison,

Wisconsin, on or about July 1, next. Until then letters and papers may be addressed to me at Ann Arbor.

One of my pupils, Professor Mark W. Harrington, has been appointed to succeed me as director of this observatory. He will enter upon the discharge of his duties about October 1.

University of Michigan, Observatory Ann Arbor, May 15, 1879.

James C. Watson.

Planeten-Beobachtungen,

angestellt am 12füssigen Aequatoreal der Leipziger Sternwarte.

Mitgetheilt von Professor *C. Bruhns.*

	Mittl. Zeit Leipzig	Planet — *		AR app.	lg. f. p.	Decl. app.	lg. f. p.	Zahl der Beob.	Vergl. Stern.	Beobachter.
		$\alpha' - \alpha$	$\delta' - \delta$							
				(15) Eunomia.						
1878										
Dec. 25	$11^h59^m4^s$	$+ 3^m53^s65$	$+5'\ 4''7$	$7^h18^m14^s28$	9.041*n*	$+26°15'\ 18''7$	0.580	15.5	1	P
29	10.43.51	— 0.30.86	—2.12.3	7.13.44.72	9.303*n*	+26. 3. 2.4	0.608	15.5	2	P
1879										
Jan. 2	9. 7.47	— 1. 4.70	+0.14.7	7. 9.10.21	9.486*n*	+25.49.46.0	0.661	15.5	3	P
7	12.27.51	— 0.29.01	—0.17.5	7. 3.12.07	8.772	+25.31. 1.7	0.585	15.5	4	P
8	8. 3.21	+ 0.19.24	+0.39.2	7. 2.15.79	9.534*n*	+25.27.52.6	0.690	15.5	5	P
				(103) Hera.						
1878										
Dec. 29	12.21.50	— 1.14.43	—3. 1.1	8. 2. 2.27	9.047*n*	+17. 8.51.7	0.700	15.5	6	P
1879										
Jan. 18	12.27.30	+ 2. 1.00	—3.53.9	7.43.57.66	8.779	+18.25.30.8	0.681	20.5	7	P
Feb. 2	8. 4.47	— 4.28.11	+1.55.4	7.30.56.01	9.391*n*	+19.23.27.1	0.704	16.4	8	P
				(65) Cybele.						
Jan. 2	10.23.20	— 0.32.38	+0.34.4	8. 8.47.65	9.430*n*	+16.54.26.0	0.734	15.5	9	P
21	9.14.33	+ 0.51.29	+4. 8.1	7.54.45.20	9.389*n*	+17.42.25.1	0.720	15.5	10	P
				(82) Alkmene.						
Jan. 21	7.18.26	+ 2.15.23	—1.47.1	6.10.52.83	9.451*n*	+28.12.31.7	0.615	20.5	11	P
				(173) Ino.						
Jan. 21	11.16. 8	— 1. 0.80	—7.52.3	8.12.11.91	8.930*n*	+ 9.58. 1.8	0.766	15.5	12	P
Feb. 2	9.48.49	+ 1.23.57	+2. 0.3	8. 1.48.18	9.122*n*	+11.28 45.5	0.756	15.5	13	P
				(17) Thetis.						
März 4	12.52.42	+ 1.57.86	+2.44.9	10.17.20.58	9.142	+15.37.37.8	0.719	18.6	14	P
7	9. 7.17		—1.14.8			+15.56. 4.9	0.726	8	15	P
18	8.43.59	+ 0.34.64	—1. 9.1	10. 6.21.80	9.206*n*	+16.55.19.9	0.709	18.6	16	P