Fowne's Chemistry, p. 137. Thence one cubic mile of hydrogen weighs over five (5) trillion grains, or 777 million pounds. And as the ring was of such density as to require one cubic mile to contain 157 grains of matter, the Neptunian mass was thirty-four(34) billion times less dense than hydrogen.

The volume of the sphere, radius three (3) billion miles, whence Neptune was detached, the ring being segmental, was $\frac{4}{3}\pi R^3 = 113$ octillion cubic miles. But the ring was in volume nine octillion cubic miles, nearly $\frac{1}{12}$ the entire mass!

What unheard of convulsion took place to disrupt the mass and cause it to part with $\frac{1}{12}$ its bulk! What inconceivable power was displayed if the dogma is true, yet all the force present was gentle centrifugal tendency caused by slow rotations of 3.36 miles per second!

The mass of the first world is $\frac{1}{2000}$ of the solar system, but $\frac{1}{12}$ the volume was required to make it. The volume of a sphere bounded by the orbit of Neptune is $\frac{1}{6}\pi D^3 = 90$* octillion cubic miles, and as it contained 4 nonillion pounds of gas, each cubic mile held 44 pounds, —17,500,000 times less in density than the lightest body on earth, the mass being homogeneous. But it was not since the centre must have been compressed.

The density of the segmental ring was 34 billion times less than hydrogen, therefore, the sphere was old when it cast away its first world, having had time to acquire internal density, greater than peripheral, in the proportion of 17 millions to 34 billions. All along we have been quoting Helmholtz, where he says:—"It required several cubic miles to weigh a single grain,"—not having made calculation, but now we do not see how he arrived at these results, as one cubic mile, by following the principle of centre of gravity, is found to have contained 157 grains.

He probably alluded to the mass when expanded larger; but if extended to half the distance of the stars, a thousand cubic miles might have been required to contain one grain of matter. And we feel that we are traversing solid ground, in basing these deductions on the doctrine of the centre of Gravity. The volume of a cylindric ring to form Neptune must have been the same as the segmental, the density being nearly equal. The diameter of a section of a cylindric ring whose length was equal to that of Neptune's orbit, in order to have the required volume, was 822,000,000 miles. Since the planet coalesced in its centre of gravity, which was its geometrical centre, the material of the ring extended 411,000,000 miles above, and the same distance below the orbit. This added 822,000,000 miles to the equatorial diameter of the mass, retarded its assumed rotation, and prevented detachment of any particle of matter. The disrupting force had to be applied, not where Neptune revolves, but 411,000,000 below, at a point where force was weakest, and resistance strongest. And then such a ring was subjected to lateral pressure, and could not be severed on that account.

The ring made up of an infinite number of solids generated by revolution of circular segments about their chords, to have the same volume as segmental and cylindric, was in radial diameter 380,000,000, and in diameter north and south 2,090,000,000 miles. If this form of ring was discarded the break took place 190,000,000 below the orbit, and along a line more than two billion miles long. Rotation was slower than the orbital velocity of Neptune, and the separation was again required to be made where the force to cause it was in minimum, and its opposing powers, gravity and cohesion, at a maximum. We reassert that in no possible case could the Neptunian matter have been detached from the primeval mass when it was a *sphere*.

Neither could it have been separated when sections of the protuberance were parabolic; thus a chord, or limiting plane, the base of a parabolic segment, in order to cut out a ring in volume sufficient to contain the Neptunian gas, was in length 634,000,000, in altitude 1,250,000,000, the vertex extending 750,000,000 above, and base descending 500,000,000 miles below, the orbit, in order that Neptune might condense in its centre of gravity. This would make the equatorial diameter of the mass 7,060,000,000 miles a physical impossibility, for rotation would have come to a dead rest ages before such elongation. Consider the curvature of sections semi-elliptical and results are still more absurd. Since the mass was unable to part with rings whose sections were hyperbolic, parabolic or semi-elliptic, we dismiss as untenable all varieties of such ring-shaped masses.

Now conceive the mass a sphere again and at rest; let rotary motion be imparted, and should the velocity become sufficient, the equatorial regions will become a swelling tide. But when a protuberance elevated motion waned, and the equator subsided. When at greatest altitude the whole mass was an ablate spheriod. Therefore, we lay down this proposition which must have obtained if the Hypothesis of ring displacement is true. If the equatorially expanding mass parted with a ring, it did so at the first opportunity.

And such fullness of time was when a segment of an ellipse could be cut away large enough to have Neptune in its centre of gravity. When the mass was an ablate spheroid, sections cut by passing planes through the entire mass, at right angles to the equator, bisecting the poles, would all be plain curves—ellipses. And a segment severed from the equator to make Neptune, was a segment of an ellipse, whose centre of gravity coincided with that planet's present track. The dimensions of this ring were, height, 319,000,000, and chord 2,350,000,000 miles, to have volume sufficient, to contain gas enough to solidify into the most remote member of the solar system. The axes of the ellipse whence this segment was cut were transverse, 5,800,000,000, and conjugate, 5,400,000,000, the diameter of the mass when spherical being 5,560,000,000 miles. Therefore, we say that during all mutation in form of the primordial cosmical mass, admitting the hypothesis true, its equatorial diameter was never augmented more than 240,000,000 miles, as is seen in these dimensions.

Mathematical instruments of delicacy are required to measure such small deviation from a sphere. Yet, it was able to discard a ring having a volume of nine octillion cubic miles. Basing conclusions on the sure foundation of the principle of the centre of gravity, we assert that the mass never detached rings whose sections were of any form of curvature known to geometry. Then none were cast off, since every department of celestial mechanics is known to be subject to rigid mathematical laws.

The theory of cosmic evolution, which holds that planets were formed of masses detached from an aeriform sphere belongs in that list of delusions which retarded the early progress of astronomy—the "Geocentric System," the "Firmament," and "Music of the Spheres."

NEW WINDSOR, ILL., *July* 10, 1881.

* Ninety Octillion.

CORRESPONDENCE.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. No notice is taken of anonymous communications.*]

To the Editor of "SCIENCE":—

Dr. J. J. Mason in his second rejoinder to the criticism made by a reviewer in SCIENCE, leaves his unknown critic to the contemplation of the latter's clause. "Notwithstanding the construction which Dr. J. J. Mason now desires to see placed on his words," and does him "the justice" of supposing that the critic

knows what he insinuated. This the critic did indeed know! In view of the inconsistency between the text of his article, and the *dementi* of his first rejoinder, he considered himself justified in insinuating that Dr. Mason had come to recognize that one of his views was untenable, and preferred to deny having entertained that view to admitting its errors publicly. If I have misinterpreted Dr. Mason's paper, I fail to see it even now, for the doctor fails to answer my question: What other than the size of the cells and their nuclei, does Dr. Mason refer to when he speaks of a structure universally admitted to be motor?" Until he answers this, I would suggest that further correspondence on this head is a waste of the space in your periodical, and that demands for "customary regrets" are premature. I am as willing now as I have been throughout not only to withdraw my original stricture, but also the statements that have grown out of the controversy, if Dr. Mason can explain this passage and those with which it is associated, differently from my interpretation, and the meaning evident on their face.

Such an explanation should, however, avoid the incongruity existing between the text of Dr. Mason's article and the explanation he now gives of his real intention in polemicizing against Stieda, which I must confess I have not been able to assimilate. Dr. Mason might also answer this question. Why has he, if his "three brief articles" relate throughout to reptiles, and Batrachians referred to the bat as bearing out his theory, and why has he incorporated an explanation as his own, which I published two years before, without even mentioning my name, or that of some one else who may have anticipated me? My publication was certainly known to Dr. Mason, and he cannot fall back upon the flimsy excuse that it was a "preliminary" communication, and had nothing to do with his subject. If the explanation was worth while incorporating in Dr. Mason's paper, it was worth while giving its author credit for it, just as it was worth while referring to the author of the Iguana article by name, if it was worth Dr. Mason's while to offer suggestions in a patronizing way, which were altogether unnecessary as a matter of instruction, and as which they seem intended to appear.

I consider this subject closed, as far as I am concerned, until such time as the main question here repeated, is properly answered.

E. C. SPITZKA.

NEW YORK, 130 E. 50th Street, July 19, 1881.

NOTES.

The *Chemiker Zeitung* states that all the English and French professors at the University of Yeddo, Japan, have been dismissed, and their places filled with Germans. The Japanese Minister of Public Instruction is a German professor. The Chinese are about establishing a German University at Pekin. These facts should be duly weighed by those who still doubt the superiority of German research over English cram and examinations!

ACCORDING to M. A. Gaudry the Permian reptiles of France diminish the vast interval which exists at present between the reptiles and the monotrematous mammals.

THE ferment which M. Béchamp supposed he had discovered in chalk has been traced, by MM. Chamberland and Roux, to an experimental error.

METEOROLOGICAL REPORT FOR NEW YORK CITY FOR THE WEEK ENDING JULY 16, 1881.

Latitude 40° 45′ 58″ N.; Longitude 73° 57′ 58″ W.; height from ground, 53 feet; above the sea, 97 feet; by self-recording instruments.

JULY.	BAROMETER. MEAN FOR THE DAY. Reduced to Freezing.	BAROMETER. MAXIMUM. Reduced to Freezing.	BAROMETER. MAXIMUM. Time.	BAROMETER. MINIMUM. Reduced to Freezing.	BAROMETER. MINIMUM. Time.	THERMOMETERS. MEAN. Dry Bulb.	THERMOMETERS. MEAN. Wet Bulb.	THERMOMETERS. MAXIMUM. Dry Bulb.	THERMOMETERS. MAXIMUM. Time.	THERMOMETERS. MAXIMUM. Wet Bulb.	THERMOMETERS. MAXIMUM. Time.	THERMOMETERS. MINIMUM. Dry Bulb.	THERMOMETERS. MINIMUM. Time.	THERMOMETERS. MINIMUM. Wet Bulb.	THERMOMETERS. MINIMUM. Time.	MAXI'M In Sun.
Sunday, 10	30.044	30.094	9 a. m.	29.982	12 p. m.	72.6	68.6	82	4 p. m.	74	4 p. m.	66	4 a. m.	65	4 a. m.	124.
Monday, 11	29.943	29.996	12 p. m.	29.900	2 p. m.	72.0	69.3	80	11 a. m.	74	11 a. m.	65	12 p. m.	63	12 p. m.	129.
Tuesday, 12	29.956	30.000	9 a. m.	29.900	12 p. m.	69.7	65.7	76	4 p. m.	70	5 p. m.	63	4 a. m.	62	5 a. m.	131.
Wednesday, 13	29.805	29.900	0 a. m.	29.744	6 p. m	79.6	73.6	90	4 p. m.	80	4 p. m.	68	3 a. m.	66	3 a. m.	135.
Thursday, 14	29.889	29.976	12 p. m.	29.794	0 a. m.	80.0	71.3	86	3 p. m.	74	2 p. m.	75	6 a. m.	69	6 a. m.	143.
Friday, 15	30.002	30.022	9 a. m.	29.976	0 a. m.	76.3	69.7	82	3 p. m.	72	1 p. m.	70	12 p. m.	67	6 p. m.	138.
Saturday, 16	29.801	29.984	0 a. m.	29.618	12 p. m	78.6	71.6	83	3 p. m.	73	3 p. m.	69	5 a. m.	67	5 a. m.	134.

		Dry.	Wet.
Mean for the week	29.920 inches.	75.5 degrees	69.9 degrees.
Maximum for the week	at 9 am., July 10th 30.094 "	at 4 pm. 13th 90. "	at 4 pm 13th, 80. "
Minimum "	at 12 pm., " 16th 29.618 "	" 4 am. 12th 63. "	at 5 am 12th, 62. "
Range	.476 "	" 27. "	18. "

JULY.	WIND. DIRECTION. 7 a. m.	2 p. m.	9 p. m.	VELOCITY IN MILES. Distance for the Day.	FORCE IN LBS. PER SQR. FEET. Max.	Time.	HYGROMETER. FORCE OF VAPOR. 7 a. m.	2 p. m.	9 p. m.	RELATIVE HUMIDITY. 7 a. m.	2 p. m.	9 p. m.	CLOUDS. CLEAR, 0 OVERCAST, 10. 7 a. m.	2 p. m.	9 p. m.	RAIN AND SNOW. DEPTH OF RAIN AND SNOW IN INCHES. Time of Beginning.	Time of Ending.	Duration, h. m.	Amount of water	OZONE.
Sunday, 10	s.	s.	s.	98	¾	3.30 pm	.577	.704	.668	84	73	85	10	2 cir. cu.	3 cir.	-----	-----	-----	--	0
Monday, 11	s. w.	s.	e. n. e.	106	11¾	11.30 am	.663	.799	.591	85	86	89	10	10	10	0.15 pm	2.00 pm	1.45	.09	2
Tuesday, 12	e. n. e.	e.	s. s. e.	113	¼	5.30 pm	.516	.604	.622	83	72	85	9 cu.	5 cu.	5 cu.	10 pm	11.30 "	1.30	.02	0
Wednesday, 13	s. s. w.	w. s. w	w. s. w.	137	2¾	2.00 pm	.644	.836	.787	85	65	74	10	0	3 cu.	4.00 pm	5.00 pm	-----	--	4
Thursday, 14	n. w.	n. n. w.	n. w.	122	1½	9.30 am	.601	.691	.664	65	57	69	0	3 cir. cu.	8 cu.	-----	-----	1.00	.01	1
Friday, 15	e. n. e.	e. s. e.	s. s. e.	130	3¼	10.00 am	.568	.677	.666	68	66	77	6 cir.cu	9 cir. s.	0	-----	-----	-----	--	0
Saturday, 16	s. w.	s. w.	w. s. w.	135	3¼	4.40 pm	.655	.677	.717	81	60	70	1 cir.	6 cir. cu.	0	-----	-----	-----	--	7

Distance traveled during the week	841 miles.	Total amount of water for the week	12 inch.
Maximum force	11¾ lbs.	Duration of rain	4 hours 15 minutes.

DANIEL DRAPER, Ph. D.

Director Meteorological Observatory of the Department of Public Parks, New York.