XXIII. History of astronomy for the year 1801

Jerome Lalande

To cite this article: Jerome Lalande (1802) XXIII. History of astronomy for the year 1801, Philosophical Magazine Series 1, 12:46, 112-121, DOI: [10.1080/14786440208676037](https://doi.org/10.1080/14786440208676037)

To link to this article: <http://dx.doi.org/10.1080/14786440208676037>

Published online: 18 May 2009.

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fraction of prisms or of lenses, or by thin plates of air or water between lenses made to approach each other, or by the rings on bubbles, or by reflections or inflections of light, may be explained from the facts contained in the above proposition.

All the experiments, observations, and reasoning above, respect only *coloured light*. I dare not venture, on theory, to assert any thing as to the existence of an elementary, pure, uncoloured, uncompounded white light; yet that some such elementary substance exists, combined with one or more of the principles of our atmosphere, and also in combustible and incombustible, and perhaps animal and vegetable substances, seems to be probable; for it can be separated from such in various operations of nature and art.

However, although light may principally exist, combined with caloric and other substances, in a gaseous form, yet it may, and it is very generally admitted, that it does also exist, independent of caloric, in solid bodies and fluids of various kinds; and heat, it cannot be denied, exists sensibly in both combustible and incombustible bodies which exhibit no visible light. Indeed, that light and heat are two distinct existing principles is now finally and demonstrably ascertained and proved by Dr. Herschel's curious experiments of the fact, showing that heat as well as light are each liable to different and peculiar refractions, by which they are separated from each other, and take a separate and distinct existence in different space.

Quod restat desideratum est.

XXIII. *History of Astronomy for the Year 1801.* By
JEROME LALANDE.

THE commencement of the 19th century was distinguished by an astronomical event, the discovery of a planet at Palermo in Sicily, by M. Piazzi, on the 1st of January*. It was as small as a star of the 8th magnitude: he observed it during forty days. The observations he sent me arrived too late for us to be able to follow it, and we were obliged to calculate its orbit from his own observations alone. Burckhardt, Olbers, Bode, Piazzi, and Gauss, have found that to represent these observations it is necessary to suppose that

* I here employ the calendar of all nations, being persuaded that the French government will soon renounce the new calendar, which is not understood, and cannot be adopted either by our neighbours or by the majority of the French themselves.—L.

it revolves in four years. The following are the elements found by Burckhardt and Gauss:

Inclination	-	-	10° 47'	Inclination	-	10° 36' 57"
Node	-	-	2° 20' 58"	Node	-	2° 21' 0 44"
Aphelion	-	2	9 0	Epoch	-	2° 16' 28'
Passage of the aphe-				Mean anom.	-	3 15 55
lion Jan. 1, 1801	8 hours			Aphelion	10° 26' 27' 38"	
Eccentricity	-	0.0364		Eccentricity	-	0.0825017
Semi-axis	-	2.574		Equation	-	- 9° 28'
Revolution	-	4.13 years		Distance	-	2.7355

The difference of these elements appeared to me to throw some doubt on the reality of this orbit of four years; but in the beginning of the year 1802 it was perfectly confirmed, and we now have a ninth planet.

On the 25th of October we received a printed memoir of Piazzi, with his observations and calculations. As he hopes that this star will be acknowledged to be a planet, he has given it the name of Ceres Ferdinandea, in honour of the king of Naples; and Bode wishes it to be called Juno: as for my part, I shall call it Piazzi, as I gave the name of Herschel to the planet discovered in 1781. The pagan deities are no longer interesting, and adulation pleases only the person who is the object of it.

On the 12th of July, in the evening, Messier, Mechain and Bouvard, each found a small comet near the head of the Great Bear; and it appears that it was seen the preceding night by Pons, concierge of the observatory at Marseilles. The Board of Longitude has given him the 600 francs which I deposited in the hands of a notary for the person who should discover a comet; the three able astronomers of Paris having themselves judged that the artist ought to be encouraged.

John Louis Pons was born at Peyre, a village in the department of the Upper Alps, on the 24th of December 1761, and has resided at the observatory of Marseilles since the 3d of February 1789: his conduct, address, and intelligence, have procured him much esteem from the director of the observatory. He constructed the night-telescope, with which he discovered the comet of the 11th of July 1801, on the model of a telescope by George Adams, which is at the School of Navigation, Marseilles. The Board of Longitude have sent him a better one.

I have had a new proof of the utility of the fifty thousand stars which I have procured to astronomy, and of the exact positions which my nephew Lefrançois has fixed for the stars formerly observed. Several of them have served to determine the places of the new comet, which Messier, Mechain and

Bouvard followed with assiduity, and the orbit of which will be very well determined, though it appeared only ten days.

Thulis has sent me seven observations, from the 12th to the 21st of July, deduced only from the azimuths and altitudes, without having been able to compare them with stars; but we were more fortunate at Paris, and Mechain had sufficient data to calculate the elements in the following manner by a first sketch:

Inclination	-	25°	{	Perihelion	-	6° 11'
Node	-	0° 8'		Distance	-	0 3
				Passage August 7, 15 hours.		

This small comet, found almost at the same time by four persons, proves that it is not difficult to discover comets. Three or four have been seen in the course of a year; and if a few amateurs would employ themselves in searching for them, it is probable that the number would rapidly increase. This is still a desideratum in astronomy; it is humiliating for us, that we do not know whether it is by thousands or tens of thousands that comets ought to be counted, and whether they return, or lose themselves in the immensity of the universe.

Nothing is necessary but a common telescope to search for and find comets, and to point out their situation to astronomers. I suppose that the observer is provided with a wooden quadrant of two feet radius, which any carpenter can make, and that a meridian has been traced out with a large circle on the floor; that the circle is divided into degrees, and that the instrument is directed towards the place where the comet is. Both the altitude and distance from the meridian will be thus found for the time of observation. Nothing more will be necessary to enable astronomers to find a comet which may have been announced. To find comets, it is not necessary, therefore, to know the stars. But there are a hundred nebulae which have some resemblance to small comets. Those who wish to distinguish them must have recourse to the *Celestial Atlas**, where they are all marked. This study will neither be long nor difficult. The *Atlas* of Berlin is much more complete: we shall give an account of it hereafter.

The night-telescope employed by Messier, and with which he has already found twenty comets, is two feet in length, and has an aperture of $2\frac{1}{2}$ inches: it has three eye-glasses. The first next the eye has a focus of $2\frac{1}{2}$ inches, and 10 lines of aperture; the second 9, and the third $9\frac{1}{2}$ inches. There are 10 lines between the two, and 5 inches between the pre-

* A Paris, chez Lamarche, rue du Foin.

ceding and the second. There is a diaphragm of 14 lines between the first and the second eye-glasses, at the distance of 2 inches from the former, and 3 from the second. This telescope magnifies only five times, but it has a field of four degrees. One of the same kind may be constructed for 70 or 80 francs.

Burckhardt also has calculated the orbits of the comets of 1763, 1771, and 1773; and for the second he has found a hyperbolic orbit.

The comet which Messier discovered on the 14th of June 1770, respecting which Burckhardt made long and learned calculations, seems to have a small circular orbit of five years seven months. However, this comet was not seen before 1770, nor has it appeared since. This can be ascribed only to great changes in its orbit.

Must we then, after having asserted, in the 18th century, that all the comets return, assert in the 19th that comets do not return, that of 1759 excepted?

On this account I no longer think but of comets; I speak of nothing but comets; and the only thing I recommend to my correspondents is to search for them, as I write to them that the only thing wanting to astronomy is the knowledge of these bodies.

On the 15th of May I had the pleasure of receiving the first copy of my *Histoire Céleste Française*, the fruit of twelve years labour, which terminates the 50,000 stars, on which my nephew Michel Lefrançois has employed the best part of his youth. It contains also observations made by D'Agelet before he set out on his voyage round the world; and those by which Darquier, aged 83 years, terminated his glorious astronomical career.

The observations of Tycho, Flamsteed, Picard, Lacaille, and Maskelyne, have been the foundation of all the progress made in astronomy. The most profound theories and the most learned calculations cannot do without them, and cannot dispute with them in regard to importance or duration. Observations alone will survive us; and observers, whom mankind too often affect to undervalue, may console themselves, that they will be the only astronomers to whom, long after their death, the praises and gratitude of our successors and of posterity will be addressed.

Lefrançois Lalande, my nephew, continues his observations, together with the calculation of 3000 declinations and 1000 right ascensions of the principal stars, each observed several times. These long and painful labours have obtained for this able observer a place in the National Institute. On

the 26th of December madame Lefrançois Lalande continued the reduction of the 50,000 stars; an immense labour, to which she has devoted herself with courage, and which her pregnancy even has not interrupted. Their son is preparing to tread in their steps, and already calculates with some success. I hope that Isaac Lalande will be the third astronomer of his name.

Delambre has observed several declinations with the multiplying circle. Piazzi has announced to us a catalogue of 700 stars, which he observed at Palermo; and Cagnoli is preparing a catalogue of 500 stars, which he observed at Paris and Verona with particular care.

Vidal, whose courage and exactness I have so often celebrated, has sent me the continuation of the austral stars, which are not well seen at Paris; the circum-polar stars which were wanting, and a very singular *triduum*. On the 23d of April and the following days he observed all the planets every day. He has joined to them observations of Mercury and the sun at the two solstices with an ingenious compass, which he employed to make a great number of observations on the declination of the magnetic needle.

Bourg, an astronomer of Vienna, who gained the prize proposed by the Institute on the inequalities of the moon, continues to employ himself on that subject. He has recalculated, with 3000 observations, the 24 inequalities of the moon; and has added new ones, which were pointed out to him by Laplace according to his theory. These tables arrived on the 8th of December; the errors do not amount to 15"; and the prize of 6000 francs, proposed by the Board of Longitude to the first who should make good lunar tables, will be well merited by this able and courageous astronomer. The Board of Longitude is still employed in verifying them; but all the observations lately made at Gotha confirm the exactness of these tables. For it was at the observatory of Gotha, the sanctuary of astronomy in Germany, that M. Bourg finished his labour. Baron von Zach had invited him thither, that he might enjoy all the comforts and conveniences he could desire.

What remains to be done in regard to the theory of the moon depends, perhaps, on some terms in which the higher powers of the eccentricities and forces must be employed. Burckhardt is now engaged in researches on that subject.

Arabian observations of the 10th century had been employed for the motions of the moon. The manuscript which I fortunately found among the papers of Joseph Delisle made us desirous of obtaining the original, which was at Leyden;
and

and the Batavian minister sent it to us. C. Caussin examined this manuscript: but it is not complete; it contains only observations already known. We found in it none of the information so much wished for respecting the instruments of the Arabians, and their method of observing; but it has furnished us with some interesting corrections for our copy, which is now printing in Arabic and French at the printing-office of the Republic by order of the minister of the interior. The observations of the summer solstice have again assured us that the obliquity of the ecliptic is $23^{\circ} 28' 6\frac{1}{2}''$, being $5''$ more than in my tables. The multiplying circles give us the truth within a second; and I think we can with certainty say that the diminution, which has occasioned so much dispute, is $33''$ per century; very far from that which C. Cassini assigned from bad observations made at the observatory with bad instruments.

The winter solstice gives us $8''$ less; but there is reason to believe that this arises from the refraction, which is not yet well enough known for small altitudes. Though the obliquity is nearly decided, the Academy of Berlin has still proposed this variation as the subject of a prize for the year 1802. It requires the most interesting researches and explanations in regard to this subject, where several points still remain to be cleared up.

All the planets have been eclipsed by the moon in the course of this year, as has been observed by Reggio in the Ephemerides of Milan. This phenomenon is rare. We were not able to make a good observation but of the eclipse of Venus on the 13th of May. We were, however, indemnified by the eclipses of that beautiful star the Virgin's Spike, observed in many places on the 30th of March and the 24th of May, which enabled me to verify the longitudes of several countries. Eclipses of four stars of the first magnitude are phenomena of very great importance for all determinations of this kind.

I have continued to discharge the task, which I imposed upon myself forty years ago, of calculating all the eclipses of the sun and stars hitherto observed, and from which astronomers had neglected to draw conclusions on account of the length of the calculations. I have corrected the longitudes of Rome and Middlebourg, and of the new city of Washington in America.

M. Leduc of Sermonetta, Gäetani, and Conti have sent me observations from Rome. M. Ciccolini has sent me some from Florence; and the day on which the king of Etruria came to the Institute, I had the pleasure of presenting

to him a determination of the longitude of Florence, which had been very badly determined, notwithstanding the celebrity of that capital, and the great number of eminent men it has produced.

M. Kautsch, a parist of Leutomischel in Bohemia, has finished an immense labour on the eclipses of the sun. He has calculated, for the whole of the 19th century, charts in which are seen all the circumstances of these eclipses for every country of the earth where they are visible, in the same manner as they have been inserted in our Ephemerides since 1750, and at present in the *Connaissance des Temps* by the care of C. Duvaucel. I wished to have the means of publishing the labour of M. Kautsch, whose zeal and ability deserve every praise.

C. Goudin has also published an analytical method for eclipses: he has applied it to the eclipse of 1847, which will be the most considerable of this century, and has calculated all its circumstances for the whole surface of the earth.

The conjunctions of the planets are not interesting to astronomers, but they afford a spectacle to the public, especially when connected with other events. Messier, therefore, remarked, that when the cannon announced to us the happiness of peace on the 3d of October, the Moon, Venus, Jupiter, and Saturn, were near that beautiful star in the Lion's heart.

We no longer live in times when such phenomena are considered as of importance, but in 1186 the astronomers announced terrible revolutions in consequence of the conjunction of all the planets. I engaged C. Flauguergues to calculate this phenomenon exactly by our new tables, and he has found that on the 15th of September at 5 h. 2 m. all the planets were between 6 signs, and 6 signs 10 degrees of longitude.

These are not complete conjunctions; exact conjunctions of all the planets are incalculable; a sketch of these returns, in which I employed only days for the duration of the revolutions, gave me 17 millions of millions of years as the interval between one conjunction and another. What would the case have been, had I taken into account the hours and minutes?

As the tables of Mars were the most incorrect, C. Lefrançois has been employed on them six months; he has calculated all the observations, and has employed all the new perturbations. He has carried his precision to tenths of seconds, and has at length constructed tables of Mars, which will leave very little to be wished for, and which have appeared

appeared in the *Connoissance des Temps* for the year 12. have seen, with pleasure, my immediate successor and dearest pupil pursue the labour which my master Lemonnier made me undertake, fifty years ago, in imitation of Tycho Brahe, who began his researches on the planet Mars, and who put Kepler in the way of making his discoveries by means of the same planet. He will soon employ himself on tables of Venus, taking into account her perturbations.

For Saturn, the error has been found $+ 1''$ in longitude and $- 9''$ in latitude. Delambre has made new researches to correct the error of $30''$ in the tables of Jupiter, but it has been found in the observations made for 60 years: we must therefore search for the cause of it in the theory, and in some new irregularities.

Bouvard has terminated his calculations of all the perturbations of the planets, each by the action of all the rest, according to the theory of Laplace. The result will be new tables, which will be still more correct.

C. Burckhardt has made an analytical and numerical calculation of the terms of the fifth order, which were not before taken into account in consequence of the length of the calculations. He has found that these terms increase the great irregularity of Saturn by one minute.

C. Chabrol has calculated observations of the sun, and has found that $7''$ must be deducted from the longitudes given by our tables. But Delambre has undertaken to calculate 7 or 800 observations of Bradley, applying 8 or 10 new equations furnished by calculations of the attraction. The eccentricity of Jupiter and the earth give equations for the sun which amount to from 8 to $9''$. We shall therefore soon have new tables of the sun still more correct than those published by Delambre ten years ago, and to which it appeared that nothing could be added.

For mercury, the error in my tables did not exceed $10''$. An observation of Venus on the 24th of May gave me an error in the tables of $+ 30''$. This seems to indicate that we ought to deduct $12''$ from the epoch, but that the equation of the orbit is good.

The *Connoissance des Temps* for the year 12 (1804), which has just appeared, contains every thing most interesting that has occurred in regard to astronomy during the last year. Curious researches respecting the theory of the moon, by Laplace; new tables of Mars, by Lefrançois-Lalande; a new catalogue of stars reduced, making the number 11,300, being a continuation of those in the preceding volumes; important observations, tables, and calculations, by Me-

chain, Delambre, Chabrol, Vidal, Thulis, Flauguergues, Ciccolini, Duc Lachapelle, Burckhardt, Bernier, Humboldt, Quenot, and several calculations by myself; with a notice of the most important works that have appeared in the course of a year.

The Ephemerides of Vienna for 1802 contain a fourth series of longitudes determined by Triefnecker, who has calculated all the eclipses of the sun and stars which have been observed; a considerable and important labour, which remained to be undertaken. M. Triefnecker has given us at the same time a table of all the preceding results in regard to the position of towns where eclipses have been observed.

The third volume of the Memoirs of the Institute, the eighth volume of the Memoirs of the Italian Society, the Ephemerides of Berlin for 1803 and 1804, those of Milan for 1801, and the Journal of Baron von Zach during the whole year, have continued to furnish interesting observations and new memoirs. Baron von Zach has procured the observations made by Lefsganig at Vienna from the year 1755 to 1774; and those which Niebuhr made in the Levant in 1761, and which he did not publish. We have received the Memoirs of the Academy of Berlin for 1796 and 1797, and the sixth volume of the Memoirs of Turin: but they contain nothing on astronomy.

The observatory of Paris, having acquired new instruments, has been put into activity by Mechain and Bouvard; and the Board of Longitude intends to print the observations of 1801 in the same form as those of Greenwich.

Caroché having finished the telescope of 22 feet, Tremel is employed in constructing a stand to support it; and the platform on which it is to be placed is already in a state of great forwardness. On all occasions we have enjoyed the happiness of having for minister a man long celebrated by his attachment to the sciences, and who, in order to be useful to them, wanted only that influence of which he is so worthy.

The transit telescope which Joseph Delisle had, in 1748, erected at the hotel de Clugny, and with which I as well as Messier made my first observations, had become almost useless by rust. The Board of Longitude wished that it should be reconstructed with platina, and our colleague Messier will have new assistance for his useful observations.

Lenoir has shown at Paris, during the public exhibition of the year 9, that the French industry is not inferior to the English; he received from government one of the twelve gold medals distributed to the most meritorious of our artists.

The

The Board of Longitude has sent a quadrant to Flauguergues at Viviers, and one to Dangos at Tarbe, to enable them to make more correct and more continued observations.

Flauguergues has already employed his observations to determine the latitude of his observatory $44^{\circ} 29' 22''$, greater by $18''$ than what was given by the triangles; he has assiduously continued to observe the eclipses of Jupiter's satellites; he has observed the spots of the sun, which were frequent this year, and has calculated a great many positions of the stars.

Chabrol has communicated to us a new analytical method for eclipses, and has calculated several; he has also verified the tables of Mars and Mercury by observations in the present year. He has reduced 600 observations of the stars, and has calculated 600 longitudes in the fundamental catalogue: in a word, he shows himself a young zealous co-operator, curious and void of ambition, who is entitled to our grateful acknowledgments.

C. Mougin, curé of La Grande-Combe-des-Bois, in the mountains of the department of Doubs, has sent us a large table of precessions; that is to say, of the annual changes of the stars in right ascension, according to the data with which I furnished him. For thirty years past we have received from this worthy pastor marks of zeal, application, curiosity, and courage, very rare, especially in the deserts.

Dr. Maskelyne has sent us his observations of 1800, a continuation of the valuable collection he has been making for 36 years; and he has announced to us the Nautical Almanac of 1806.

[To be concluded in our next.]

XXIV. *Some Account of the Poisonous and Injurious Honey of North America.* By BENJAMIN SMITH BARTON, M. D.*

IN the year 1785 I had an opportunity of observing some of the disagreeable effects of our wild honey upon several persons who had eaten of it, in the western parts of Pennsylvania, near the river Ohio. From these effects I was persuaded, that a substance which is generally considered as entirely innocent, is capable of doing much injury to the constitution. I was, therefore, induced to pay some

* Read before the American Philosophical Society, and communicated to the Editor of the Philosophical Magazine by the author. It will form part of the fifth volume of the American Transactions.

attention