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XVIII. Catalogue of 500 new neb nebulous stars, planetary nebula:, and clusters of stars; with remarks on the construction of the heavens

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XVIII. *Catalogue of* 500 *new Nebulæ, nebulous Stars, planetary Nebulæ, and Clusters of Stars; with Remarks on the Construction of the Heavens. By* William Herschel, *LL. D. F. R. S.*

Read July 1, 1802.

SINCE the publication of my former two catalogues of nebulæ, I have, in the continuation of my telescopic sweeps, met with a number of objects that will enrich our natural history, as it may be called, of the heavens. A catalogue of them will be found at the end of this paper, containing 500 new nebulæ, nebulous stars, planetary nebulæ, and clusters of stars. These objects have been arranged in eight classes, in conformity with the former catalogues, of which the present one is therefore a regular continuation. This renders it unnecessary to give any further explanation, either of the contents of its columns, or the abbreviations which have been used in the description of the objects.

It has hitherto been the chief employment of the physical astronomer, to search for new celestial objects, whatsoever might be their nature or condition; but our stock of materials is now so increased, that we should begin to arrange them more scientifically. The classification adopted in my catalogues, is little more than an arrangement of the objects for the convenience of the observer, and may be compared to the disposition of the books in a library, where the different sizes of the volumes is often more considered than their contents. But here, in dividing the different parts of which the sidereal heavens are composed into proper classes, I shall have to examine the nature of the various celestial objects that have been hitherto discovered, in order to arrange them in a manner most conformable to their construction. This will bring on some extensive considerations, which would be too long for the compass of a single paper; I shall therefore now only give an enumeration of the species that offer themselves already to our view, and leave a particular examination of the separate divisions, for some early future occasions.

In proceeding from the most simple to the more complex arrangements, several methods, taken from the known laws of gravitation, will be suggested, by which the various systems under consideration may be maintained; but here also we shall confine ourselves to a general review of the subject, as observation must furnish us first with the necessary data, to establish the application of any one of these methods on a proper foundation.

ENUMERATION OF THE PARTS THAT ENTER INTO THE CONSTRUCTION OF THE HEAVENS.

I. *Of insulated Stars.*

In beginning our proposed enumeration, it might be expected that the solar system would stand foremost in the list; whereas, by treating of insulated stars, we seem, as it were, to overlook one of the great component parts of the universe. It will, however, soon appear that this very system, magnificent as it is, can only rank as a single individual belonging to the species which we are going to consider.

By calling a star insulated, I do not mean to denote its being totally unconnected with all other stars or systems; for no one, by the laws of gravitation, can be intirely free from the influence of other celestial bodies. But, when stars are situated at such immense distances from each other as our sun, Arcturus, Capella, Lyra, Sirius, Canobus, Markab, Bellatrix, Menkar, Shedir, Algorah, Propus, and numberless others probably are, we may then look upon them as sufficiently out of the reach of mutual attractions, to deserve the name of insulated stars.

In order not to take this assertion for granted, without some examination, let us admit, as is highly probable, that the whole orbit of the earth's annual motion does not subtend more than an angle of one second of a degree, when seen from Sirius. In consequence of this, it appears by computation, that our sun and Sirius, if we suppose their masses to be equal, would not fall together in less than 33 millions of years, even though they were not impeded by many contrary attractions of other neighbouring insulated stars; and that, consequently, with the assistance of the opposite energies exerted by such surrounding stars, these two bodies may remain for millions of ages, in a state almost equal to undisturbed rest. A star thus situated may certainly deserve to be called insulated, since it does not immediately enter into connection with any neighbouring star; and it is therefore highly probable, that our sun is one of a great number that are in similar circumstances. To this may be added, that the stars we consider as insulated are also surrounded by a magnificent collection of innumerable stars, called the milky-way, which must occasion a very powerful balance of opposite attractions, to hold the intermediate stars in a state of rest. For, though our sun, and all the stars we see, may truly be said to be in the plane of the milky-way, yet I am now convinced, by a long inspection and continued examination of it, that the milky-way itself consists of stars very differently scattered from those which are immediately about us. But of this, more will be said on another occasion.

From the detached situation of insulated stars, it appears that they are capable of being the centres of extensive planetary systems. Of this we have a convincing proof in our sun, which, according to our classification, is one of these stars. Now, as we enjoy the advantage of being able to view the solar system in all its parts, by means of our telescopes, and are therefore sufficiently acquainted with it, there will be no occasion to enter into a detail of its construction.

The question will now arise, whether every insulated star be a sun like ours, attended with planets, satellites, and numerous comets? And here, as nothing appears against the supposition, we may from analogy admit the probability of it. But, were we to extend this argument to other sidereal constructions, or, still farther, to every star of the heavens, as has been done frequently, I should not only hesitate, but even think that, from what will be said of stars which enter into complicated sidereal systems, the contrary is far more likely to be the case; and that, probably, we can only look for solar systems among insulated stars.

II. *Of Binary sidereal Systems, or double Stars.*

The next part in the construction of the heavens, that offers itself to our consideration, is the union of two stars, that are formed together into one system, by the laws of attraction.

If a certain star should be situated at any, perhaps immense, distance behind another, and but very little deviating from the line in which we see the first, we should then have the appearance of a double star. But these stars, being totally unconnected, would not form a binary system. If, on the contrary, two stars should really be situated very near each other, and at the same time so far insulated as not to be materially affected by the attractions of neighbouring stars, they will then compose a separate system, and remain united by the bond of their own mutual gravitation towards each other. This should be called a real double star; and any two stars that are thus mutually connected, form the binary sidereal system which we are now to consider.

It is easy to prove, from the doctrine of gravitation, that two stars may be so connected together as to perform circles, or similar ellipses, round their common centre of gravity. In this case, they will always move in directions opposite and parallel to each other; and their system, if not destroyed by some foreign cause, will remain permanent.

Figure 1 (Plate XVI.) represents two equal stars *a* and *b*, moving in one common circular orbit round the centre *o*, but in the opposite directions of *at* and *bt*. In Fig. 2 we have a similar connection of the two stars *a b*; but, as they are of different magnitudes, or contain unequal quantities of matter, they will move in circular orbits of different dimensions round their common centre of gravity *o*. Fig. 3 represents equal, and Fig. 4 unequal stars, moving in similar elliptical orbits round a common centre; and, in all these cases, the directions of the tangents *t t*, in the places *a b*, where the stars are, will be opposite and parallel, as will be more fully explained hereafter.

These four orbits, simple as they are, open an extensive field for reflection, and, I may add, for calculation. They shew, even before we come to more complicated combinations, where the same will be confirmed, that there is an essential difference between the construction of solar and sidereal systems. In each solar system, we have a very ponderous attractive centre, by which all the planets, satellites, and comets are governed, and kept in their orbits. Sidereal systems take a greater scope: the stars of which they are composed move round an empty centre, to which they are nevertheless as firmly bound as the planets to their massy one. It is however not necessary here to enlarge on distinctions which will hereafter be strongly supported by facts, when clusters of stars come to be considered. I shall only add, that in the subordinate bodies of the solar system itself, we have already instances, in miniature, as it may be called, of the principle whereby the laws of attraction are applicable to the solution of the most complicated phenomena of the heavens, by means of revolutions round empty centres. For, although both the earth and its moon are retained in their orbits by the sun, yet their mutual subordinate system is such, that they perform secondary monthly revolutions round a centre without a body placed in it. The same indeed, though under very narrow limits, may be said of the sun and each planet itself.

That no insulated stars, of nearly an equal size and distance, can appear double to us, may be proved thus. Let Arcturus and Lyra be the stars: these, by the rule of insulation, which we must now suppose can only take place when their distance from each other is not less than that of Sirius from us, if very accurately placed, would be seen under an angle of 60 degrees from each other. They really are at about 59°. Now, in order to make these stars appear to us near enough to come under the denomination of a double star of the first class, we should remove the earth from them at least 41253 times farther than Sirius is from us. But the space-penetrating power of a 7-feet reflector, by which my observations on double stars have been made, cannot intitle us to see stars at such an immense distance; for, even the 40-feet telescope, as has been shewn,* can only reach stars of the 1342d magnitude. It follows, therefore, that these stars could not remain visible in a 7-feet reflector, if they were so far removed as to make their angular distance less than about $24\frac{1}{4}$ minutes; nor could even the 40-feet telescope, under the same circumstances of removal, shew them, unless they were to be seen at least $2\frac{1}{2}$ minutes asunder. Moreover, this calculation is made on a supposition that the stars of which a double star is composed, might be as small as any that can possibly be perceived; but if, on the contrary, they should still appear of a considerable size, it will then be so much the more evident that such stars cannot have any great real distance, and that, consequently, insulated stars cannot appear double, if they are situated at equal distances from us. If, however, their arrangement should be such as has been mentioned before, then, one of them being far behind the other, an apparent double star may certainly be produced; but here the appearance of proximity would be deceptive; and the object so circumstanced could not be classed in the list of binary systems. However, as we must grant, that in particular situations stars apparently double may be composed of such as are insulated, it cannot be improper to consult calculation, in order to see whether it be likely that the 700 double stars I have given in two catalogues, as well as

* See Phil. Trans. for 1800, Part I. page 83.

many more I have since collected, should be of that kind. Such an inquiry, though not very material to our present purpose, will hereafter be of use to us, when we come to consider more complicated systems. For, if it can be shown that the odds are very much against the casual production of double stars, the same argument will be still more forcible, when applied to treble, quadruple, or multiple compositions.

Let us take ζ Aquarii, for an instance of computation. This star is admitted, by FLAMSTEED, DE LA CAILLE, BRADLEY, and MAYER, to be of the 4th magnitude. The two stars that compose it being equal in brightness, each of them may be supposed to shine with half the light of the whole lustre. This, according to our way of reckoning magnitudes,* would make them 4m $\times \sqrt{2} = 5\frac{2}{3}$m; that is, of between the 6th and 5th magnitude each. Now, the light we receive from a star being as the square of its diameter directly, and as the square of its distance inversely, if one of the stars of ζ Aquarii be farther off than the stars of between the 6th and 5th magnitude are from us, it must be so much larger in diameter, in order to give us an equal quantity of light. Let it be at the distance of the stars of the 7th magnitude; then its diameter will be to the diameter of the star which is nearest to us as 7 to $5\frac{2}{3}$, and its bulk as 1,885 to 1; which is almost double that of the nearest star. Then, putting the number of stars we call of between the 6th and 5th magnitude at 450, we shall have 686 of the 7th magnitude to combine with them, so that they may make up a double star of the first class, that is to say, that the two stars may not be more than 5″ asunder. The surface of the globe contains

* The expressions 2m, 3m, 4m, &c. stand for stars at the distance of 2, 3, 4, &c. times that of Sirius, supposed unity.

34036131547 circular spaces, each of 5″ in diameter; so that each of the 686 stars will have 49615357 of these circles in which it might be placed; but, of all that number, a single one would only be the proper situation in which it could make up a double star with one of the 450 given stars. But these odds, which are above $75\frac{1}{2}$ millions to one against the composition of ζ Aquarii, are extremely increased by our foregoing calculation of the required size of the star, which must contain nearly double the mass allotted to other stars of the 7th magnitude; of which, therefore, none but this one can be proper for making up the required double star. If the stars of the 8th and 9th magnitudes, of which there will be 896 and 1134, should be taken in, by way of increasing the chance in favour of the supposed composition of our double star, the advantage intended to be obtained by the addition of numbers, will be completely counteracted by the requisite uncommon bulk of the star which is to serve the purpose; for, one of the 8th magnitude, ought to be more than $2\frac{3}{4}$ times bigger than the rest; and, if the composition were made by a star of the 9th magnitude, no less than four times the bulk of the other star which is to enter the composition of the double star would answer the purpose of its required brightness. Hence therefore it is evident, that casual situations will not account for the multiplied phenomena of double stars, and that consequently their existence must be owing to the influence of some general law of nature; now, as the mutual gravitation of bodies towards each other is quite sufficient to account for the union of two stars, we are authorised to ascribe such combinations to that principle.

It will not be necessary to insist any further on arguments drawn from calculation, as I shall soon communicate a series of observations made on double stars, whereby it will be seen, that *many of them have actually changed their situation with regard to each other, in a progressive course, denoting a periodical revolution round each other; and that the motion of some of them is direct, while that of others is retrograde.* Should these observations be found sufficiently conclusive, we may already have their periodical times near enough to calculate, within a certain degree of approximation, the parallax and mutual distance of the stars which compose these systems, by measuring their orbits, which subtend a visible angle.

Before we leave the subject of binary systems, I should remark, that it evidently appears, that our sun does not enter into a combination with any other star, so as to form one of these systems with it. This could not take place without our immediately perceiving it; and, though we may have good reason to believe that our system is not perfectly at rest, yet the causes of its proper motion are more probably to be ascribed to some perturbations arising from the proper motion of neighbouring stars or systems, than to be placed to the account of a periodical revolution round some imaginary distant centre.

III. *Of more complicated sidereal Systems, or treble, quadruple, quintuple, and multiple Stars.*

Those who have admitted our arguments for the existence of real double stars, will easily advance a step farther, and allow that three stars may be connected in one mutual system of reciprocal attraction. And, as we have from theory pointed out, in figures 1, 2, 3, and 4, how two stars may be maintained in a binary system, we shall here shew that three stars may likewise be preserved in a permanent connection, by revolving in proper orbits about a common centre of motion.

In all cases where stars are supposed to move round an empty centre, in equal periodical times, it may be proved that an imaginary attractive force may be supposed to be lodged in that centre, which increases in a direct ratio of the distances. For since, in different circles, by the law of centripetal forces, the squares of the periodical times are as the radii divided by the central attractive forces, it follows, that when these periodical times are equal, the forces will be as the radii. Hence we conclude, that in any system of bodies, where the attractive forces of all the rest upon any one of them, when reduced to a direction as coming from the empty centre, can be shewn to be in a direct ratio of the distance of that body from the centre, the system may revolve together without perturbation, and remain permanently connected without a central body.

Hence may be proved, as has been mentioned before, that two stars will move round a hypothetical centre of attraction. For, let it be supposed that the empty centre *o*, in Fig. 1 and 3, is possessed of an attractive force, increasing in the direct ratio of the distances $oa : ob$. Then, since here ao and bo are equal, the hypothetical attractions will be equal, and the bodies will revolve in equal times. That this agrees with the general law of attraction, is proved thus. The real attraction of b upon a is $\frac{b}{ab^2}$; and that of a upon b is $\frac{a}{ab^2}$; and, since $b = a$, it will be $\frac{b}{ab^2} : \frac{a}{ab^2} :: ao : bo$; which was required.

In Figures 2 and 4, when the stars a and b are unequal, and their distances from o also unequal, let $oa = n$, and $ob = m$; and let the mass of matter in $a = m$, and in $b = n$. Then the attraction of b on $a = \frac{b}{ab^2}$, will be to the attraction of a on b $= \frac{a}{ab^2}$, as $n : m$; which is again directly as $ao : bo$.

I proceed now to explain a combination of three bodies, moving round a centre of hypothetical attraction. Fig. 5 contains a single orbit, wherein three equal bodies a b c, placed at equal distances, may revolve permanently. For, the real attraction of b on a will be expressed by $\frac{a}{ab^2}$; but this, reduced to the direction ao, will be only $\frac{b \, . \, by}{ab^3}$; for, the attraction in the direction ba is to that in the direction by, parallel to ao, as $\frac{b}{ab^2}$ to $\frac{b \, . \, by}{ab^3}$. The attraction also of c on a is equal to that of b on a; therefore the whole attraction on a, in a direction towards o, will be expressed by $\frac{2b \, . \, by}{ab^3}$. In the same manner we prove, that the attraction of a and c on b, in the direction bo, is $\frac{2a \, . \, by}{ab^3}$; and that of a and b on c, in the direction co, is $\frac{2c \, . \, by}{ab^3}$. Hence, a b and c being equal, the attractions in the directions ao bo and co will also be equal; and, consequently, in the direct ratio of these distances. Or rather, the hypothetical attractions being equal, it proves that, in order to revolve permanently, a b and c must be equal to each other.

Instead of moving in one circular orbit, the three stars may revolve in three equal ellipses, round their common centre of gravity, as in Fig. 6. And here we should remark, that this centre of gravity will be situated in the common focus o, of the three ellipses; and that the absolute attraction towards that focus, will vary in the inverse ratio of the squares of the distances of any one of the stars from that centre, while the relative attractions remain in the direct ratio of their several distances from the same centre. This will be more fully explained, when we come to consider the motion of four stars.

A very singular straight-lined orbit, if so it may be called, may also exist in the following manner. If *a* and *b*, Fig. 7, are two large equal stars, which are connected together by their mutual gravitation towards each other, and have such projectile motions as would cause them to move in a circular orbit about their common centre of gravity, then may a third small star *c*, situated in a line drawn through *o*, and at rectangles to the plane described by the stars *a b*, fall freely from rest, with a gradually acquired motion to *o*; then, passing through the plane of the orbit of the two stars, it will proceed, but with a gradually retarded motion, to a second point of rest *d*; and, in this manner, the star *c* may continue to oscillate between *c* and *d*, in a straight line, passing from *c*, through the centre *o*, to *d*, and back again to *c*.

In order to see the possibility and permanency of this connection the better, let *o* be the centre of gravity of the three bodies, when the oscillating body is at *c*; then, supposing the bodies *a* and *b* to be at that moment in the plane *p l*, and admitting *m* to represent a body equal in mass to the two bodies *a b*, *o* will be the common centre of gravity of *m* and *c*. Then, by the force of attraction, the body *c* and the fictitious body *m* will meet in *o*; that is to say, the plane *p l*, of the bodies *a b*, will now be at *p′ l′*. The fictitious body *m* may then be conceived to move on till it comes to *n*, while the body *c* goes to *d*; or, which is the same, the plane of the bodies *a b* will now be in the position *p″ l″*, as much beyond the centre of gravity *o*, as it was on the opposite side *m*. By this time, both the fictitious body *m*, now at *n*, and the real body *c*, now at *d*, have lost their motion in opposite directions, and begin to approach to their common centre of gravity *o*, in which they will meet a second time. It is evident that the orbit of the two large stars will suffer considerable perturbations, not only in its plane, but also in its curvature, which will not remain strictly circular; the construction of the system, however, is such as to contain a sufficient compensation for every disturbing force, and will consequently be in its nature permanent.

In order to add an oscillating star, it is not necessary that the two large stars should be so situated as to move in a circular orbit, without the oscillating star. In Fig. 8, the stars *a* and *b* may have such projectile forces given them as would cause them to describe equal ellipses, of any degree of excentricity. If now the small star *c* be added, the perturbations will undoubtedly affect not only the plane of the orbits of the stars, but also their figures, which will become irregular moveable ovals. The extent also of the oscillations of the star *c* will be affected; and will sometimes exceed the limits *c d*, and sometimes fall short of them. All these varieties may easily be deduced from what has been already said, when Fig. 7 was considered. It is however very evident, that this system also must be permanent; since not only the centre of gravity *o* will always be at rest, but *a o*, whatever may be the perturbations arising from the situation of *c*, will still remain equal to *b o*.

It should be remarked, that the vibratory motion of the star *c* will differ much from a cometary orbit, even though the latter should be compressed into an evanescent ellipsis. For, while the former extends itself over the diameter of a globe in which it may be supposed to be inscribed, the hypothetical attractive force being supposed to be placed in its centre, the cometary orbit will only describe a radius of the same globe, on account of its requiring a solid attractive centre.

After what has been said, it will hardly be necessary to add, that with the assistance of any proper one of the combinations pointed out in the four last figures, the appearance of every treble star may be completely explained; especially when the different inclinations of the orbits of the stars, to the line of sight, are taken into consideration.

If we admit of treble stars, we can have no reason to oppose more complicated connections; and, in order to form an idea how the laws of gravitation may easily support such systems, I have joined some additional delineations. A very short explanation of them will be sufficient.

Fig. 9 (Plate XVII.) represents four stars, a b c and d, arranged in a line; a being equal to b, and c equal to d. Then, if $ao = bo$, and $co = do$, the centre of gravity will be in o; and, with a proper adjustment of projectile forces, the four stars will revolve in two circular orbits round their common centre. By calculating in the manner already pointed out, it will be found, that when, for instance, $ao = 1$, $co = 3$, and $c = d = 1$, then the mass of matter in $a = b$, will be required to be equal to 1,3492.

It is not necessary that the projectile force of the four stars should be such as will occasion them to revolve in circles. The system will be equally permanent when they describe similar ellipses about the common centre of gravity, which will also be the common focus of the four ellipses. In Fig. 10, the stars a b c d, revolving in ellipses that are similar, will always describe, at the same time, equal angles in each ellipsis about the centre of hypothetical attraction; and, when they are removed from a b c d to a' b' c' d', they will still be situated in a straight line, and at the same proportionate distances from each other as before. By this it appears, as we have already observed, that the absolute hypothetical force in the situation *a′ b′ c′ d′*, compared to what it was when the stars were at *a b c d*, is inversely as the squares of the distances; but that its comparative exertion on the stars, in their present situation, is still in a direct ratio of their distances from the centre *o*, just as it was when they were at *a b c d;* or, to express the same perhaps more clearly, the force exerted on *a′*, is to that which was exerted on *a* as $\frac{1}{\overline{a'o}|^2} : \frac{1}{\overline{ao}|^2}$. But the force exerted on *a* is to that exerted on *c*, in our present instance, as $ao = 1$ to $co = 3$; and still remains in the same ratio when the stars are at *a′* and *c′;* for the exertion will here be likewise as $a'o = 1$ to $c'o = 3$.

Fig. 11 represents four stars in one circular orbit; and its calculation is so simple, that, after what has been said of Fig. 5, I need only remark that the stars may be of any size, provided their masses of matter are equal to each other.

It is also evident, that the projectile motion of four equal stars is not confined to that particular adjustment which will make them revolve in a circle. It will be sufficient, in order to produce a permanent system, if the stars *a b c d*, in Fig. 12, are impressed with such projectile forces as will make them describe equal ellipses round the common centre *o*. And, as the same method of calculation which has been explained with Figs. 6 and 10 may here be used, it will not be necessary to enter into particulars.

Fig. 13 represents four stars, placed so that, with properly adjusted projectile forces, they may revolve in equal times, and in two different circles, round their common centre of gravity *o*.

If $ao = bo = 4$, $co = do = 5$, and $c = d = 1$, then will the mass of matter in $a = b$, required for the purpose, be 1,5136. This arrangement, remarkable as it may appear, cannot be made in all situations; for instance, if the distance $ao = bo$ were assumed equal to 1, that of $co = do$ being 2, it would be impossible to find such quantities of matter in *a* and *b* as would unite the four stars into one system.

As we have shewn how the arrangement in Fig. 10 may be derived from that of Fig. 9, so it will equally appear, that four stars may revolve in different but similar ellipses round their common centre, as in Fig. 14. For here the four stars, when placed at *a b c d*, are exactly in the situation represented in Fig. 13; but, on account of different projectile forces, they revolve, not as before in concentric circles, but in similar elliptical orbits.

Fig. 15 represents three stars, *a b c*, in the situation of Fig. 5, to which a small oscillating star, *d*, is added. The addition of such a star to Fig. 1, has been sufficiently explained in Fig. 7; and, what has been remarked there, may easily be applied to our present figure. As the fictitious body *m*, in Fig. 7, was made to represent the stars *a* and *b*, it will now stand for the three stars *a b* and *c*. If we suppose these stars to be of an equal magnitude in both figures, the centre of gravity *o*, of the three stars, will not be so far from *m* and *n* as in Fig. 7; and the perturbations will be proportionally lessened.

Fig. 16 gives the situation of three stars, *a b c*, moving in equal elliptical orbits about their common focus *o*, while the star *d* performs oscillations between *d* and *e*. What has been said in explaining Fig. 8, will be sufficient to shew, that the present arrangement is equally to be admitted among the constructions of sidereal systems that may be permanent.

We have before remarked, that any appearance of treble stars might be explained, by admitting the combinations pointed out in Figs. 5, 6, 7, and 8; and it must be equally obvious, that quadruple systems, under what shape soever they may show themselves, whether in straight lines, squares, trapezia, or any other seemingly the most irregular configurations, will readily find a solution from one or other of the arrangements of the eight last figures.

More numerous combinations of stars may still take place, by admitting simple and regular perturbations; for then all sorts of erratic orbits of multiple flexures may have a permanent existence. But, as it would lead me too far, to apply calculation to them, I forbear entering upon the subject at present.

Before I proceed, it will be proper to remark, that it may possibly occur to many, who are not much acquainted with the arrangement of the numberless stars of the heavens, that what has been said may all be mere useless surmise; and that, possibly, there may not be the least occasion for any such speculations upon the subject. To this, however, it may be answered, that such combinations as I have mentioned, are not the inventions of fancy: they have an actual existence; and, were it necessary, I could point them out by thousands. There is not a single night when, in passing over the zones of the heavens by sweeping, I do not meet with numerous collections of double, treble, quadruple, quintuple, and multiple stars, apparently insulated from other groups, and probably joined in some small sidereal system of their own. I do not imagine that I have pointed out the actual manner in which they are held together; but it will always be a desirable step towards information, if the possibility of such unions, in many different ways, can be laid before us; and, very probably, those who have more leisure to consider the different combinations of central forces, than a practical astronomer can have, may easily enlarge on what has been laid down in the foregoing paragraphs.

IV. *Of clustering Stars, and the Milky-way.*

From quadruple, quintuple, and multiple stars, we are naturally led to a consideration of the vast collections of small stars that are profusely scattered over the milky-way. On a very slight examination, it will appear that this immense starry aggregation is by no means uniform. The stars of which it is composed are very unequally scattered, and show evident marks of clustering together into many separate allotments. By referring to some one of these clustering collections in the heavens, what will be said of them will be much better understood, than if we were to treat of them merely in a general way. Let us take the space between β and γ Cygni for an example, in which the stars are clustering with a kind of division between them, so that we may suppose them to be clustering towards two different regions. By a computation, founded on observations which ascertain the number of stars in different fields of view, it appears that our space between β and γ, taking an average breadth of about five degrees of it, contains more than 331 thousand stars; and, admitting them to be clustering two different ways, we have 165 thousand for each clustering collection. Now, as a more particular account of the milky-way will be the subject of a separate paper, I shall only observe, that the above mentioned milky appearances deserve the name of clustering collections, as they are certainly brighter about the middle, and fainter near their undefined borders. For, in my sweeps of the heavens, it has been fully ascertained, that the brightness of the milky-way arises only from stars; and that their compression increases in proportion to the brightness of the milky-way.

We may indeed partly ascribe the increase, both of brightness and of apparent compression, to a greater depth of the space which contains these stars; but this will equally tend to shew their clustering condition: for, since the increase of brightness is gradual, the space containing the clustering stars must tend to a spherical form, if the gradual increase of brightness is to be explained by the situation of the stars.

V. *Of Groups of Stars.*

From clustering stars there is but a short transition to groups of stars; they are, however, sufficiently distinct to deserve a separate notice. A group is a collection of closely, and almost equally compressed stars, of any figure or outline; it contains no particular condensation that might point out the seat of an hypothetical central force; and is sufficiently separated from neighbouring stars to shew that it makes a peculiar system of its own. It must be remembered, that its being a separate system does not exclude it from the action or influence of other systems. We are to understand this with the same reserve that has been pointed out, when we explained what we called insulated stars.

The construction of groups of stars is perhaps, of all the objects in the heavens, the most difficult to explain; much less can we now enter into a detail of the numerous observations I have already made upon this subject. I therefore proceed in my enumeration.

VI. *Of Clusters of Stars.*

These are certainly the most magnificent objects that can be seen in the heavens. They are totally different from mere groups of stars, in their beautiful and artificial arrangement: their form is generally round; and the compression of the stars shews a gradual, and pretty sudden accumulation towards the centre, where, aided by the depth of the cluster, which we can have no doubt is of a globular form, the condensation is such, that the stars are sufficiently compressed to produce a mottled lustre, nearly amounting to the semblance of a nucleus. A centre of attraction is so strongly indicated, by all the circumstances of the appearance of the cluster, that we cannot doubt a single moment of its existence, either in a state of real solidity, or in that of an empty centre, possessed of an hypothetical force, arising from the joint exertion of the numerous stars that enter into the composition of the cluster.

The number of observations I have to give relating to this article, in which my telescopes, especially those of high space-penetrating power, have been of the greatest service, of course can find no room in this enumeration.

VII. *Of Nebulæ.*

These curious objects, which, on account of their great distance, can only be seen by instruments of great space-penetrating power, are perhaps all to be resolved into the three last mentioned species. Clustering collections of stars, for instance, may easily be supposed sufficiently removed to present us with the appearance of a nebula of any shape, which, like the real object of which it is the miniature, will seem to be gradually brighter in the middle. Groups of stars also may, by distance, assume the semblance of nebulous patches; and real clusters of stars, for the same reason, when their composition is beyond the reach of our most powerful instruments to resolve them, will appear like round nebulæ that are gradually much brighter in the middle. On this occasion I must remark, that with instruments of high space-penetrating powers, such as my 40-feet telescope, nebulæ are the objects that may be perceived at the greatest distance. Clustering collections of stars, much less than those we have mentioned before, may easily contain 50000 of them; and, as that number has been chosen for an instance of calculating the distance at which one of the most remote objects might be still visible,* I shall take notice of an evident consequence attending the result of the computation; which is, that a telescope with a power of penetrating into space, like my 40-feet one, has also, as it may be called, a power of penetrating into time past. To explain this, we must consider that, from the known velocity of light, it may be proved, that when we look at Sirius, the rays which enter the eye cannot have been less than 6 years and $4\frac{1}{2}$ months coming from that star to the observer. Hence it follows, that when we see an object of the calculated distance at which one of these very remote nebulæ may still be perceived, the rays of light which convey its image to the eye, must have been more than nineteen hundred and ten thousand, that is, almost two millions of years on their way; and that, consequently, so many years ago,

* See Phil. Trans. for 1800, page 83. N. B. In the same page, line 22, for 5000 read 50000.

this object must already have had an existence in the sidereal heavens, in order to send out those rays by which we now perceive it.

VIII. *Of Stars with Burs, or Stellar Nebulæ.*

Situated as we are, at an immense distance from the remote parts of the heavens, it is not in the power of telescopes to resolve many phenomena we can but just perceive, which, could we have a nearer view of them, might probably shew themselves as objects that have long been known to us. A stellar nebula, perhaps, may be a real cluster of stars, the whole light of which is gathered so nearly into one point, as to leave but just enough of the light of the cluster visible to produce the appearance of burs. This, however, admits of a doubt.

IX. *Of milky Nebulosity.*

The phenomenon of milky nebulosity is certainly of a most interesting nature: it is probably of two different kinds; one of them being deceptive, namely, such as arises from widely extended regions of closely connected clustering stars, contiguous to each other, like the collections that construct our milky-way. The other, on the contrary, being real, and possibly at no very great distance from us. The changes I have observed in the great milky nebulosity of Orion, 23 years ago, and which have also been noticed by other astronomers, cannot permit us to look upon this phenomenon as arising from immensely distant regions of fixed stars. Even HUYGENS, the discoverer of it, was already of opinion that, in viewing it, we saw, as it were, through an opening into a region of light.* Much more would

* See *Systema Saturnium*, page 8 and 9.

he be convinced now, when changes in its shape and lustre have been seen, that its light is not, like that of the milky-way, composed of stars. To attempt even a guess at what this light may be, would be presumptuous. If it should be surmised, for instance, that this nebulosity is of the nature of the zodiacal light, we should then be obliged to admit the existence of an effect without its cause. An idea of its phosphorical condition, is not more philosophical, unless we could shew from what source of phosphorical matter, such immeasurable tracts of luminous phenomena could draw their existence, and permanency; for, though minute changes have been observed, yet a general resemblance, allowing for the difference of telescopes, is still to be perceived in the great nebulosity of Orion, even since the time of its first discovery.

X. *Of nebulous Stars.*

The nature of these remarkable objects is enveloped in much obscurity. It will probably require ages of observations, before we can be enabled to form a proper estimate of their condition. That stars should have visible atmospheres, of such an extent as those of which I have given the situation in this and my former catalogues, is truly surprising, unless we attribute to such atmospheres, the quality of self-luminous milky nebulosity. We can have no reason to doubt of the starry nature of the central point; for, in no respect whatever does its appearance differ from that of a star of an equal magnitude; but, when the great distance of such stars is taken into consideration, the real extent of the surrounding nebulosity is truly wonderful. A very curious one of this kind will be found in the 4th class, No. 69, of the annexed catalogue.

XI. *Planetary Nebulæ.*

This seems to be a species of bodies that demands a particular attention. To investigate the planetary nature of these nebulæ, is not an easy undertaking. If we admit them to contain a great mass of matter, such as that of which our sun is composed, and that they are, like the sun, surrounded by dense luminous clouds, it appears evidently that the intrinsic brightness of these clouds must be far inferior to those of the sun. A part of the sun's disk, equal to a circle of 15″ in diameter, would far exceed the greatest lustre of the full moon; whereas, the light of a planetary nebula, of an equal size, is hardly equal to that of a star of the 8th or 9th magnitude. If, on the other hand, we should suppose them to be groups, or clusters of stars, at a distance sufficiently great to reduce them to so small an apparent diameter, we shall be at a loss to account for their uniform light, if clusters; or for their circular forms, if mere groups of stars.

Perhaps they may be rather allied to nebulous stars. For, should the planetary nebulæ with lucid centres, of which the next article will give an account, be an intermediate step between planetary nebulæ and nebulous stars, the appearances of these different species, when all the individuals of them are fully examined, might throw a considerable light upon the subject.

XII. *Of planetary Nebulæ with Centres.*

In my second catalogue of nebulæ, a single instance of a planetary nebula with a bright central point was mentioned; and, in the annexed one, No. 73 of the 4th class, is another of very nearly the same diameter, which has also a lucid, though not quite so regular a centre. From several particularities observed in their construction, it would seem as if they were related to nebulous stars. If we might suppose that a gradual condensation of the nebulosity about a nebulous star could take place, this would be one of them, in a very advanced state of compression. A further discussion of this point, however, must be reserved to a future opportunity.

CORRECTION OF A FORMER PAPER.

In my Paper on two lately discovered celestial Bodies,
Page 224, line 18, of this volume, instead of 135, read 31.

Catalogue of 500 additional new Nebulæ, and Clusters of Stars.

First Class. Bright Nebulæ.

I.	1788.	Stars.		M.	S.		D.	M.	♀	Description.
216	Dec. 3	22 Ursæ	*p*	13	52	*f*	3	4	2	*v*B.*p*L.*i*F.*r*.*mb*M. Towards the *ff*, within the nebulosity, is a *v*S.*ft*.
217	27	54 Persei	*f*	9	25	*n*	0	46	2	*c*B. *c*L. *mb*M. Stands nearly in the center of a trapezium.
218	31	63 Aurigæ	*f*	26	43	*f*	0	20	1	*c*B. R. *vgmb*M. about 3′*d*.
	1789									
219	Mar. 23	55 Ursæ	*f*	5	33	*n*	0	36	1	*v*B. *c*L. *i*F. *vgmb*M.
220	Apr. 12	64 (γ) Ursæ	*p*	43	59	*f*	0	20	2	*c*B. *m*E. 70° *np ff*. 3 or 4′ *l*, 2′ *b*.
221	—	—	—	*p* 21	41	*f*	0	37	2	*c*B. R. *vgmb*M, 4 or 5′*d*.
222	—	—	*p*	20	20	*f*	0	35	2	*c*B. *i*E. near mer. *gb*M. 2′*l*.
223	—	—	*f*	6	4	*f*	2	45	2	*v*B. *m*E. *np ff*. BN. 5′*l*. 1½′*b*.
224	—	1 Canum	*p*	9	19	*f*	3	10	2	*c*B. *p*L. *m*E. SN.
225	—	—	*p*	8	31	*f*	0	46	2	*v*B. *p*L. B*r*N. just *f a cft*.
226	14	64 (γ) Ursæ	*p*	33	32	*f*	0	34	1	*c*B.R.SB*r*N and *v*F chev. 4′*d*.
227	—	—	*p*	15	28	*n*	2	37	2	*c*B *c*L. *i*F. *r*. *vgb*M. 3′ *l*. 2′*b*.
228	—	—	*p*	5	20	*n*	2	24	2	*v*B. *v*B*i*N. and F. bran. 1½′*l*. ¾′ *b*.
229	—	—	*f*	3	46	*n*	1	47	1	The 2d of 2. *v*B. R. *vgb*M. See II. 791.
230	—	83 Ursæ	*f*	20	24	*n*	0	27	2	*c*B. S. E. *fp nf*. *c*BN. and F bran.
231	—	—	*f*	24	34	*n*	0	10	2	*c*B. *p*S. *i*R.
232	—	—	*f*	27	7	*n*	0	16	1	The 2d of 2. *c*B.S.R. *vgmb*M. See III. 791.
233	17	44 Ursæ	*f*	1	14	*f*	0	16	2	*c*B. E. 30° *fp nf*. *r*. *mb*M. 3′*l*. 1½′*b*.

I.	1789.	Stars.		M.	S.		M.	D	Ob.	Description.
234	Apr. 17	74 Ursæ -	*f*	1	31	*f*	0	28	2	*c*B. S. *l*E. Just *p a p*L *ft*.
235	—	12 (ι) Draconis	*p*	66	52	*f*	2	3	2	*c*B. *i*F *vgmb*M. 7′ *l*, 5′ *b*.
236	—	— —	*p*	59	56	*f*	2	13	3	*v*B. S. *i*R. B*ir*N. *vgmb*M.
237	—	— —	*p*	54	10	*f*	0	52	1	B. *i* oval. *vgmb*M.
238	24	69 Ursæ Hev.	*f*	27	55	*f*	0	32	2	*c*B. *p*L. *i*R *vgmb*M.
239	—	— —	*f*	28	10	*f*	0	17	3	*c*B. *p*L. E. *mb*M.
240	—	— —	*f*	28	34	*f*	0	17	2	*c*B. *p*L. E. SBN.
	1790									
241	Feb. 17	19 (ξ) Hyd. Crat.	*p*	14	43	*f*	0	57	1	*c*B. E. 70° *np ff*. *vgb*M 7′ *l*, 4′ *b*. within a parallelogram.
242	Mar. 17	15 (*f*) Ursæ	*p*	15	40	*f*	0	21	1	*v*B. LB*r*N. with *v*F chev.
243	—	77 (ε) Ursæ	*f*	1	47	*n*	2	25	1	*c*B. S. R. *gb*M.
244	18	39 Ursæ -	*f*	36	44	*n*	0	40	2	*c*B. R. *vgmb*M. 1½′ *d*.
245	—	— —	*f*	39	27	*n*	1	58	3	*v*B. *c*L. R. *vgb*M.
246	—	66 Ursæ -	*p*	29	19	*n*	0	20	2	*c*B. *p*L. E.
247	—	— —	*p*	28	13	*n*	2	0	2	*v*B. *p*L. *l*E. near par. *mb*M.
248	—	— —	*p*	7	5	*n*	2	52	2	*c*B. *p*L. *i*F.
249	19	17 Ursæ -	*p*	9	0	*n*	3	43	2	*c*B. E. near par. *er*. *b*M. 4′ *l*, 2′ *b*. I suppose, with a higher power and longer attention, the stars would become visible.
250	—	— —	*p*	4	47	*n*	3	17	1	*v*B. *c*L. *l*E. LBNM.
251	—	76 Ursæ -	*p*	50	48	*f*	2	3	1	*v*B. perfectly R. BN and F chev. *vgb*M. 1½′ *d*.
252	—	— —	*p*	41	11	*f*	0	34	1	*v*B. *c*L. R.
253	—	— —	*p*	41	46	*f*	0	51	1	*v*B. *v*L. E.
254	—	— —	*p*	1	47	*f*	1	8	1	*e*B. E. par. 5′ *l*. all over equally B. except just on the edges.
255	—	69 Ursæ Hev.	*f*	19	26	*n*	1	1	1	*v*B. BENM. 3′ *l*. ½′ *b*.
256	—	— —	*f*	21	33	*n*	0	13	1	*v*B. *p*L. *i*F. suddenly *mb*M.
257	Oct. 9	12 Eridani	*f*	16	58	*f*	1	58	1	*c*B. *i*R *vgmb*M. 1½′ *d*.
258	Dec. 28	47 (λ) Persei	*p*	3	41	*n*	1	0	1	*v*B. *i*F. *r*. *b*M. 5′ *l*. 4′ *b*. A *p*L star in it towards the *f* side, but unconnected.

I.	1791.	Stars.		M. S.		D. M.	20	Description.
259	Mar. 7	17 Hydræ Crat.	*f*	18 31	*n*	0 27	1	*c*B. *p*L. *l*E. *gb*M. The brightness takes up a large space of it.
260	Apr. 2	23 (*b*) Ursæ	*p*	1 49	*f*	0 34	1	*v*B. *v*S. *i*R. *mb*M.
261	1793 Feb. 4	38 of the *Connois.*	*f*	3 7	*f*	1 35	1	*v*B. *i*R. *vgb*M. 5′*d*. Seems to have 1 or 2 stars in the middle, or an *i*N; the chev. diminishes *vg*.
262	Apr. 6	1 (λ) Draconis	*p*	2 6	*f*	2 41	1	*c*B. *v*S. *i*F. N. with *v*F. chev.
263	—	4 Draconis -	*p*	22 48	*f*	0 23	1	*c*B. *l*E. *b*M.
264	7	— —	*p*	14 18	*n*	1 36	1	*c*B. S. *b*M.
265	8	37 Ursæ -	*p*	16 16	*n*	1 5	1	*c*B. S. *i*R. *vgmb*M.
266	—	— —	*p*	13 35	*f*	0 11	1	*c*B. *p*L. *i*F. *gb*M.
267	—	39 Ursæ -	*f*	11 21	*f*	0 10	1	*c*B. *p*L. *i*R. 1¼′*d*. The greatest part of it almost equally B.
268	—	— —	*f*	12 46	*f*	0 4	1	*v*B. *v*S. R. Stellar.
269	—	— —	*f*	18 1	*n*	0 29	1	*c*B. R. 1′*d*. just *n* of a S*ft*.
270	—	— —	*f*	35 36	*n*	1 42	2	*v*B. *c*L. E. par. SN. E par.
271	—	— —	*f*	35 54	*n*	0 55	1	*v*B. *c*L. E. *mb*M.
272	1796 Mar. 4	Georgian planet	*p*	0 53	*n*	0 6	2	*c*B. S. *i*R. BN. *mb*M. This nebula was seen at 9^h 27′, sidereal time; the telescope being out of the meridian.
273	Nov. 22	A double star	*f*	5 45	*f*	0 39	3	*v*B. *v*L. E. near par. The determining star follows 5 Draconis Hevelii 13′ 54″ in time, and is 0° 23′ more south.
274	—	— —	*f*	10 13	*f*	0 24	3	*c*B. *v*S. *i*R. *b*M.
275	Dec. 10	5 Dracon. Hev.	*f*	1 32	*n*	0 12	2	*c*B. S. R.
276	—	— —	*f*	2 45	*n*	0 12	2	*c*B. *c*L. *i*F. *l*E. *mb*M.
277	—	— —	*f*	6 20	*n*	0 20	2	*v*B. *c*L. *l*E. *mb*M.
278	12	— —	*p*	11 5	*f*	0 15	1	*c*B. *c*L. *i*R. *mb*M.

I.	1796.	Stars.		M.	S.		D.	M.		Description.
279	Dec. 12	— —	*p*	10	28	*n*	1	38	2	*c*B. *c*L. *l*E. *b*M.
280	—	16 (ζ) Ursæ min.	*f*	51	33	*n*	0	3	3	*v*B. *c*L. *l*E. *lb*M. The greatest brightnes confined to a small point.
	1798									
281	Dec. 9	τ Apps. Sculps. L. C. 95 -	*p*	1	47	*n*	0	27	1	*c*B. E. *np ff*. NM. 6′*l*. 1½′*b*.
	1801									
282	Apr. 2	208 (N) Camelop. of Bode's Cat.	*p*	153	15	*f*	2	43	1	*c*B. *p*L. *i*F.
283	—	— —	*p*	113	40	*f*	3	4	1	*c*B. *c*L. *er*.
284	—	— —	*p*	85	18	*f*	0	23	1	*c*B. *v*S. *i*F.
285	Nov. 8	24 (*d*) Ursæ	*f*	13	14	*f*	1	53	1	*v*B. *v*L. E. *np ff*. 6′*l*. 2′*b*.
286	—	— —	*f*	30	0	*f*	1	8	1	*v*B. *c*L. R. *vgmb*M. On the north-following side there is a F ray interrupting the roundness.
287	Dec. 7	1 (λ) Draconis	*p*	4	37	*n*	1	13	1	*c*B. *m*E. *np ff*. *mb*M. 3′*l*, 1′*b*.
	1802									
288	Sept. 26	184 Camelopar. of Bode's Cat.	*p*	11	58	*f*	2	34	1	*v*B. *c*L. *l*E. suddenly *mb*M.

Second Class. Faint Nebulæ.

II.	1789.	Stars.		M.	S.		D.	M.		Description.
769	Feb. 22	81 (*g*) Geminor.	*p*	37	58	*n*	0	4	1	*p*B. *p*L. *i*R. *er*. *b*M.
770	—	62 Ursæ -	*p*	13	44	*f*	2	15	1	*p*B. *p*L. R. *lb*M.
771	Mar. 20	26 (χ) Virginis	*p*	7	0	*n*	0	26	2	*p*B *c*L. *i*F. *er*. *mb*M. 4 or 5′*d*.
772	—	— —	*f*	3	9	*n*	0	57	2	F. S. E.
773	—	— —	*f*	3	5	*n*	1	1	2	F. S. E. *b*M.
774	—	— —	*f*	6	27	*n*	0	55	2	*p*B. S. *i*R. *mb*M.
775	23	55 Ursæ -	*f*	3	31	*f*	0	25	1	*p*B. *c*L. *l*E. *vgmb*M.
776	—	26 (χ) Virginis	*p*	8	19	*f*	0	4	1	F. *v*L. *er*.
777	—	— —	*f*	17	15	*n*	1	9	1	F. S. R. *b*M.
778	—	— —	*f*	21	12	*n*	1	54	1	F. S. *ff*. a double star.
779	—	26 (χ) Virginis	*f*	22	44	*n*	0	14	1	F. S.
780	26	46 (γ) Hydræ	*f*	1	22	*f*	1	14	1	F. R. *r*. *vglb*M. 4′*d*.

II.	1789.	Stars.		M.	S.		D.	M.	No.	Description.
781	Apr. 12	1 Canum -	*p*	10	55	*ſ*	0	53	2	A *p*S. *ſt.* involved in nebulosity of no great extent; the *ſt.* does not seem to belong to it.
782	14	64 (γ) Ursæ	*p*	31	7	*n*	0	7	1	*p*B. S. R. *vgmb*M. just *f* a S*ſt.*
783	—	— —	*p*	18	40	*n*	0	50	1	*p*B. *p*L. *b*M.
784	—	— —	*p*	17	41	*n*	0	37	1	*p*B. *c*L. *l*E. 3′*l.*
785	—	— —	*p*	7	3	*n*	2	18	1	*p*B. S. *l*E.
786	—	— —	*p*	3	31	*n*	1	39		F. E.
787 }	—	— —	*p*	3	2	*n*	1	27	1	{ Two nebulæ; the 1st *p*B. S.
788 }				3	7		1	24		The 2d *p*B. S.
789 }	—	— —	*f*	1	35	*n*	1	38	1	{ Two nebulæ; the 1st *p*B. E.
790 }										The 2d F. S.
791	—	— —	*f*	3	24	*n*	1	48	1	The 1st of 2. *p*B. S. E. See I. 229.
792	—	1 Canum -	*p*	3	12	*n*	2	47	1	F. S. R. *b*M.
793	—	— —	*p*	0	57	*n*	2	36	2	F. *p*L. *i*F. *b*M.
794	—	77 (ε) Ursæ	*p*	11	32	*ſ*	0	49	2	F. S.
795	—	— —	*p*	8	25	*ſ*	1	13	2	*p*B. *v*S. *mb*M.
796	—	— —	*p*	7	20	*ſ*	1	25	2	*p*B. *c*S. *l*E. B*r*N.
797	—	81 Ursæ -	*p*	3	33	*ſ*	2	18	2	*p*F. *p*S. R. *vgb*M.
798	—	83 Ursæ -	*f*	0	49	*n*	1	1	1	*p*B. E. 1½′*l*, ½′*b*.
799	—	— —	*f*	21	27	*n*	1	7	2	*p*B. *c*L. E.
800	—	— —	*f*	25	7	*n*	1	2	1	*p*B. S.
801	—	— —	*f*	27	27	*n*	0	23	2	F. *c*L.
802	17	71 Ursæ -	*p*	15	20	*n*	1	33	1	F. S. E.
803	—	— —	*p*	13	57	*n*	0	59	2	F. S. R.
804	—	— —	*p*	5	43	*ſ*	0	3	1	*p*B. *p*L. *i*F.
805	—	— —	*p*	4	41	*n*	1	20	1	The 2d of 2. *p*B. *p*L. *mb*M. See III. 798.
806	—	— —	*p*	2	13	*n*	1	42	1	*p*B.
807	—	12 (ι) Draconis	*p*	55	48	*n*	0	42	1	*p*B. E. *mer.* 1½′*l*, ¾*b*.
808	24	Neb. II. 756	*p*	24	16	*n*	0	41	1	*p*B. S. *i*F. *er.* mixed with some *p*L. stars, which may perhaps belong to it.
809	—	— —	*p*	15	5	*ſ*	0	26	1	F. S. E.

II.	1789.	Stars.		M. S.		D. M	0	Description.
810	Apr. 24	21 (μ) Draconis	*p*	46 31	*n*	3 23	1	*p*F. *p*S. *l*E.
811	—	— —	*p*	44 9	*n*	0 50	1	*p*B. *i*R. *vgvlb*M.
812	—	— —	*f*	10 4	*n*	2 55	1	F. S. R. *vglb*M.
813	26	5 Canum	*p*	10 53	*f*	0 50	1	*p*B. S. *l*E.
814	—	7 Canum	*f*	20 24	*n*	1 20	1	F. S. *vfmb*M.
815	—	82 Ursæ -	*p*	31 48	*f*	0 52	1	F. *v*S. Stellar.
816	—	— —	*p*	26 52	*f*	1 36	1	F. S. *i*R. *vgmb*M.
817	—	— —	*p*	3 42	*f*	1 40	1	*p*B. S. R. *vgb*M.
818	—	12 Draconis	*p*	40 16	*n*	0 33	1	*p*F. *c*S. R. *vgb*M.
	1790							
819	Mar. 8	13(λ)Hyd.Crat.	*p*	11 58	*n*	0 31	1	*p*F. *p*L. *i*F. *b*M.
820	10	65 Aurigæ	*f*	7 22	*n*	0 1	1	*p*B. S. Stellar.
821	—	70 Geminorum	*p*	1 43	*n*	0 12	1	*p*B. *c*S. *r*. *p a cft*.
822	17	27 Lyncis -	*p*	25 42	*n*	0 41	1	*p*F. R. *r*. *vgb*M.
823	—	15 (*f*) Ursæ	*p*	12 10	*f*	0 18	1	*p*B. S. R. *mb*M.
824	—	26 Ursæ -	*f*	139 17	*f*	0 1	1	*p*B. *m*E. 6′*l*, 2′*b*.
825	—	— —	*f*	139 40	*f*	1 44	1	*p*B. S. *i*F. *b*M.
826	—	77 (ε) Ursæ	*f*	28 0	*n*	1 42	1	F. S. E.
827	—	— —	*f*	69 19	*n*	3 27	1	*p*B. S. *i*F. *mb*M.
828	18	17 Ursæ -	*p*	6 25	*f*	2 57	1	*p*B. S. *vgmb*M.
829	—	66 Ursæ -	*p*	31 14	*n*	1 9	2	F. E. *np ff*. *er*. 1½′*l*.
830	—	— —	*p*	15 23	*f*	0 20	1	*p*B. E.
831	—	— —	*p*	11 44	*n*	1 22	1	*p*B. *v*S. *l*E.
832	—	— —	*p*	6 53	*n*	2 52	2	*p*B. *p*L. R. The nebulosity of this runs into that of I. 248.
833	—	— —	*p*	1 1	*n*	1 46	1	F. S.
834	19	17 Ursæ -	*p*	11 34	*n*	3 10	1	*p*F. *p*S. *i*F. *er*.
835	—	29 (υ) Ursæ	*f*	5 11	*n*	0 15	2	F. S. E. near par.
836	—	76 Ursæ -	*p*	70 41	*f*	0 53	1	F. S. R. *r*. almost of equal light throughout.
837	—	— —	*p*	66 54	*f*	1 0	1	*p*B. *l*E.
838	—	— —	*p*	66 15	*f*	3 9	1	*p*B. S.
839	—	— —	*p*	63 0	*f*	2 28	1	*p*B. *c*S. R. *mb*M.
840	—	— —	*p*	47 30	*f*	2 16	1	F. S. *b*M.
841	—	69 Ursæ Hev.	*f*	4 24	*n*	2 46	2	The 1st of 2. *p*B. S. *i*F.
842	—	— —	*f*	4 35	*n*	2 50	2	The 2d of 2. *p*B. *p*L. *i*F.

II.	1790.	Stars.		M.	S.		D.	M.	Ob.	Description.
843	Mar. 19	— —	f	26	40	n	0	42	1	F. S.
844	—	— —	f	27	43	ʃ	0	29	1	pB. cL.
845	20	50 (α) Ursæ	f	22	41	n	1	44	3	pB. pL. iR. bM.
846	—	76 Ursæ -	p	23	9	n	3	13	1	pB. mE. ʃp nf. BN. 5′l, ½′b.
847	—	— —	p	19	1	n	3	8	1	pB. S. lE.
848	—	— —	p	14	21	n	2	8	1	F. iF. bM. Stellar.
849	—	— —	p	9	7	n	1	15	1	pB. vS. lE. SN.
850	—	— —	p	7	16	n	0	48	1	pB. pL. iR. r. vgbM.
851	Oct. 9	72 Pegasi -	f	18	3	ʃ	0	6	2	pF. pL. iR. lbM. ʃp. a vSʃt.
852	—	σ Fornacis L. C. 285 - -	p	4	15	ʃ	0	34	1	F. pL. iR. gbM.
853	Nov. 26	29 (π) Androm.	p	25	38	ʃ	0	24	1	F. S. E. near mer.
854	Dec. 25	44 Piscium -	f	3	49	n	0	56	1	pB. vS. R. vgmbM. pretty well defined on the margin.
855	—	— —	f	4	44	n	0	10	2	pB. cL. iR. r. vgbM. ʃp. a vSʃt.
856	—	— —	f	13	52	n	1	8	1	F. S. vgbM.
857	—	— —	f	13	52	n	0	53	1	F. S. vgbM.
858	—	— —	f	14	10	n	0	58	1	pB. S. vgbM.
859	—	98 (μ) Piscium	f	20	28	n	0	1	1	pB. S. E. near par. ʃp. a Sʃt.
860	28	Mayer's Zod. Cat. No. 18	p	5	48	n	0	39	1	pF. vS. vgbM.
861	—	57 Aurigæ -	f	17	30	n	1	54	1	pB. pL. iF. gbM.
862	—	— —	f	23	5	n	1	29	1	F. pL.
863	29	63 (δ) Piscium	p	0	39	n	0	44	1	- - - pL. lE. r. gbM.
	1791									
864	Mar. 7	17 Hyd. Crat.	f	16	46	ʃ	0	1	1	pB S. R. vgmbM. almost resembling a N.
865 } 866 }	—	— —	f	34	2	ʃ	0	31	1	Two nebulæ, both F. S. R. bM. and nearly in the same par.
867	April 2	73 Ursæ -	p	14	8	ʃ	1	12	1	pB. vS. Stellar.
868 } 869 }	3	14 (τ) Ursæ	f	10 11	38 8	n	0	47	1	Two nebulæ, the 1st F. S. iF. The 2d F. pL. E.

II.	1791.	Stars.		M. S.		D. M.	90	Description.
870	April 3	35 Ursæ -	*f*	2 50	*ſ*	0 36	1	F. S. *i*R. Almost of equal light throughout.
871	—	— —	*f*	3 37	*ſ*	0 52	1	F. *v*S. *mb*M.
872	—	— —	*f*	21 30	*n*	0 11	1	F. *c*L. *i*R.
873	May 6	13 (γ) Ursæ min.	*f*	37 53	*ſ*	1 17	1	F. R. *b*M. 1′*d*.
874	24	37 (ξ) Bootis	*f*	34 48	*ſ*	1 12	1	*p*B. *p*L. *i*R. *vgmb*M.
875	30	25 Herculis	*f*	3 10	*n*	2 12	1	*p*B. S. *l*E. *vgmb*M.
	1792							
876	Apr. 20	22 (*f*) Bootis	*p*	15 58	*n*	0 26	1	*p*B. *v*S.
877	—	— —	*p*	13 27	*n*	1 21	1	*p*B. *p*L. *i*F.
878	Sept. 16	3 Cephei Hev.	*p*	29 15	*ſ*	0 25	1	*p*B. *i*F. *b*M. contains 2 stars.
	1793							
879	April 6	1 (λ) Draconis	*p*	9 49	*ſ*	2 5	1	*p*B. S. R. *b*M.
880	—	— —	*p*	7 44	*n*	0 6	2	F. S. *l*E. *ſp nf*. but near mer. *gb*M.
881	7	4 Draconis	*p*	45 43	*n*	0 12	1	F. *m*E. *np ff*. but near par. $1\frac{1}{2}$′*l*.
882	8	37 Ursæ -	*p*	10 40	*n*	1 3	1	*p*B. *p*L. *l*E. *b*M.
883	—	— —	*p*	8 36	*n*	0 8	1	F. S. R. *b*M.
884	—	39 Ursæ -	*f*	22 42	*ſ*	0 37	1	F. S. R. *b*M.
885	—	— —	*f*	37 41	*n*	0 42	1	F. S. *l*E. *np ff*.
886	—	— —	*f*	44 5	*ſ*	0 2	1	*p*B. *i*F.
887	9	42 Ursæ -	*f*	2 41	*n*	1 56	1	F. *p*L. *i*F. *b*M.
888	—	— —	*f*	7 21	*n*	0 11	1	F. S. R. *b*M.
889	May 12	19 Bootis Hev.	*p*	26 45	*n*	0 20	1	*p*B. *p*L. R. just foll. a S*ſt*.
890	—	— —	*p*	13 20	*n*	0 33	1	*p*B. *p*L. *i*R.
891	—	— —	*f*	6 44	*n*	0 8	1	*p*B. *p*L. *l*E. BM.
892	—	— —	*f*	7 44	*n*	0 24	1	F. S. E. near mer.
893	—	— —	*f*	9 37	*ſ*	0 22	1	*p*B. S. *i*F.
894	—	— —	*f*	10 46	*ſ*	0 31	1	F. S.
895	13	93 (τ) Virginis	*p*	21 54	*ſ*	0 40	1	F. S. *i*R.
896	—	— —	*p*	21 49	*ſ*	0 40	1	F. S. *i*R.
897	Sept. 6	53 Aquarii	*p*	16 29	*n*	0 7	1	*p*B. *l*E. *r*. $1\frac{1}{2}$′*l*. $1\frac{1}{4}$′*b*.
	1794							
898	Mar. 22	Georgian planet	*f*	3 0	*n*	0 33	1	F. 3′ north of a *p*L. red *ſt*. This nebula was seen at 8h 49′, sidereal time, the

II.	1797.	Stars.		M.	S.		D.	M.	Ob.	Description.
										telescope being out of the meridian.
899	Dec. 20	4 (*b*) Ursæ min.	*p*	26	13	*s*	0	40	1	F. S. E. near mer. 1′*l*.
	1798									
900	Dec. 10	18 (ε) Eridani	*p*	20	53	*s*	1	5	1	F. E. *sp nf*. near par. 3′*l*, 1′*b*.
	1799									
901	June 29	93 Herculis -	*p*	27	30	*s*	0	11	1	F. S. *i*F. *er*. 2′*l*.
902	—	— —	*f*	7	47	*n*	0	49	1	F. *p*L. R. *vgb*M. 3½′*d*.
	1801									
903	April 2	208 (N) Camelop. of BODE's Cat.	*p*	139	19	*s*	1	39	1	F. *p*L. *r*.
904	—	— —	*p*	68	9	*s*	1	58	1	F. *p*L. *lb*M.
905	—	— —	*p*	36	53	*s*	2	22	1	*p*B. *p*L.
906	Nov. 28	11 (α) Draconis	*f*	86	13	*n*	0	8	1	F. S. *l*E. *sp nf*. *vglb*M.
	1802									
907	June 26	2 (μ) Lyræ	*f*	5	21	*n*	0	18	1	F. S. *i*F.

Third Class. Very faint Nebulæ.

III.	1788.	Stars.		M.	S.		D.	M.	Ob.	Description.
748	Dec. 3	43 Camelop.	*f*	35	5	*n*	0	29	1	*v*F. *v*S. has a *v*F. bran *nf*.
749	—	22 Ursæ -	*p*	12	45	*s*	0	24	1	*c*F. *v*S.
750	31	63 Aurigæ -	*f*	48	58	*n*	0	43	1	*v*F. S. R. *lb*M.
751	—	39 Lyncis -	*f*	25	15	*s*	0	30	2	*e*F. S.
	1789									
752	Feb. 22	16 (ζ) Cancri	*p*	4	19	*n*	0	8	1	*e*F. *l*E. *s* of a *v*S*st*.
753	—	33 (η) Cancri	*p*	8	11	*s*	0	4	1	*v*F. S. R. *vlb*M.
754	24	6 Corvi -	*p*	17	33	*s*	1	43	1	*e*F. *v*S. R.
755, 756	Mar. 20	26 (χ) Virginis	*p*	13	3	*n*	0	20	1	Two nebulæ, both *v*F. *v*S. E. within 1½′ of each other.
757	—	— —	*p*	5	25	*n*	0	38	2	2 *v*S. stars involved in *v*F. nebulosity of no great extent.

III.	1789.	Stars.			M. S.		D. M.	o.	Description.
758 / 759	Mar. 23	—	—	*f*	20 55	*n*	1 53	1	Two nebulæ, both *v*F. *v*S.
760	—	—	—	*f*	23 47	*f*	0 9	1	*c*F. *v*S. R.
761	—	—	—	*f*	24 55	*n*	0 18	1	*v*F. S.
762	—	102 (υ′) Virginis		*p*	11 30	*n*	0 36	1	*v*F. *v*S.
763	—	105 (φ) Virginis		*p*	1 1	*f*	0 1	1	*e*F. S.
764	26	9 (β) Corvi		*p*	4 55	*n*	0 15	1	*c*F. *p*S. R. Stellar.
765	—	45 (ψ) Hydræ		*p*	1 35	*f*	0 53	1	*v*F. *p*L. *i*F.
766	—	—	—	*f*	0 39	*f*	0 16	1	*v*F. *v*S.
767	Apr. 12	64 (γ) Ursæ		*p*	78 24	*f*	3 45	1	*v*F. *p*S. *i*E.
768	—	—	—	*p*	30 48	*f*	0 49	2	*v*F. *v*S. Stellar.
769	—	—	—	*p*	1 40	*f*	1 44	1	*c*F. S.
770	14	—	—	*p*	39 32	*n*	2 2	1	*v*F. *v*S. Stellar.
771	—	—	—	*p*	19 37	*n*	1 8	1	*e*F. S. *i*E. On account of the brightness of 179 Ursæ maj. of BODE's Cat. which was in the field of view with it, I had nearly overlooked it.
772	—	—	—	*p*	19 2	*n*	1 16	1	*v*F. Stellar.
773	—	—	—	*p*	14 0	*n*	2 32	1	*c*F. *p*S. *l*E. just *f* a *v*S*ft*.
774	—	—	—	*p*	10 37	*f*	0 58	2	*v*F. S.
775	—	—	—	*p*	10 17	*f*	1 1	1	*v*F. *v*S.
776	—	—	—	*p*	9 33	*n*	2 12	1	*e*F. *p*L. *l*E.
777	—	1 Canum	-	*p*	1 54	*f*	0 33	1	*e*F. S. Stellar.
778	—	77 (ε) Ursæ		*p*	9 10	*f*	1 4	2	*c*F. S. *l*E. *i*F.
779	—	—	—	*f*	11 36	*n*	0 20	2	*v*F. S.
780	—	—	—	*f*	12 37	*f*	0 19	1	*c*F. S.
781 / 782	—	—	—	*f*	12 30 / 12 44	*f*	2 22 / 2 20	1	Two nebulæ. Both *v*F. S.
783	—	—	—	*f*	12 33	*f*	2 28	1	*v*F. S. E.
784	—	81 Ursæ	-	*p*	7 6	*n*	0 9	1	*c*F. S. *i*R.
785	—	83 Ursæ	-	*f*	4 34	*n*	0 37	1	2 *e*F. *ft*. with nebulosity.
786	—	—	—	*f*	14 3	*f*	0 22	1	*v*F. *v*S. Stellar.
787	—	—	—	*f*	22 27	*f*	0 28	1	*v*F. *v*S.
788	—	—	—	*f*	23 47	*f*	0 24	1	*v*F. *v*S.
789	—	—	—	*f*	23 54	*f*	0 22	1	*v*F. *v*S.

III.	1789.	Stars.		M.	S.		D.	M.	No.	Description.
790	Apr. 14	83 Ursæ	*f*	25	23	ſ	0	17	1	*v*F. *p*L.
791	—		*f*	27	7	*n*	0	16	1	The 1st of 2. *v*F. S. 4′ dist. from I. 232.
792	17	44 Ursæ	*p*	2	11	*n*	0	50	1	*v*F. S. E. 20° *ſp nf*. *er*.
793	—	48 (β) Ursæ	*f*	1	25	ſ	0	10	1	*v*F. *v*S. Stellar. The brightness of β Ursæ is so considerable, that it requires much attention to perceive this nebula.
794	—	71 Ursæ	*p*	22	30	*n*	1	8	1	*c*F. S. ver 300.
795	—	— —	*p*	16	8	*n*	2	5	2	*v*F. S. *i*F. *r*.
796	—	— —	*p*	11	23	*n*	2	52	1	*e*F.
797	—	— —	*p*	10	56	*n*	3	11	2	*v*F. S.
798	—	— —	*p*	5	4	*n*	1	20	1	The 1st of 2. *c*F. *l*E. *i*F. II. 805.
799	—	— —	*p*	1	12	*n*	1	36	1	*v*F. *v*S.
800 } 801	—	— —	*p*	1	9	*n*	1	37	1	{ Two nebulæ, both *e*F. *c*S. R.
802	—	74 Ursæ	*f*	4	54	*n*	0	30	2	The 1st of 2. *v*F. S. *l*E. See III. 807.
803	—	69 Ursæ Hev.	*f*	9	33	ſ	2	53	2	*e*F. *v*S.
804	—	— —	*f*	46	59	ſ	2	18	2	*e*F. S. E. *r*.
805	—	— —	*f*	48	9	ſ	0	1	3	*e*F. *v*S. R. Stellar.
806	—	12 (ι) Draconis	*p*	34	20	*n*	0	8	1	*v*F. *v*S. *l*E.
807	24	74 Ursæ	*f*	5	26	*n*	0	34	1	The 2d of 2. *e*F. S. E. differently from III. 802.
808	—	69 Ursæ Hev.	*p*	7	35	ſ	2	19	1	*c*F. S. E.
809	—	— —	*f*	27	7	ſ	1	25	1	*v*F. *v*S.
810	—	— —	*f*	30	44	ſ	0	13	1	*c*F. *v*S. R.
811	—	Neb. II. 756	*f*	0	32	*n*	0	2	1	*v*F. S. E.
812	—	21 (μ) Draconis	*p*	55	20	*n*	3	18	1	*v*F. *v*S. *l*E.
813	—	— —	*p*	36	1	*n*	1	14	1	*v*F. *v*S. *i*R.
814	26	5 Canum	*p*	15	0	*n*	0	32	1	*v*F. S. *er*.
815	—	7 Canum	*f*	18	48	ſ	0	22	1	S. Stellar.
816	—	— —	*f*	25	11	*n*	1	33	1	*e*F. S. *l*E.
817	—	— —	*f*	26	43	*n*	0	45	1	*c*F. S. *i*F.
818	—	— —	*f*	33	4	ſ	1	7	1	*c*F. S. R. *vglb*M.

III.	1789.	Stars.		M.	S.		D.	M.	Ob.	Description.
819	Apr. 26	82 Ursæ -	*p*	32	15	ſ	2	12	1	*v*F.
820	—	— —	*p*	29	17	ſ	2	48	1	2*v*S stars at less than 1′ *d.* with *v*F. nebulosity between them.
821	—	— —	*p*	12	59	ſ	0	7	1	*c*F. Stellar.
822	—	— —	*p*	6	23	ſ	1	25	1	*c*F. *p*S. *i*R. *lb*M.
823	—	— —	*p*	5	5	ſ	1	18	1	*c*F. *p*L. R. *vlb*M.
824	1790 Mar. 8	7(α)Hyd.Crat.	*f*	7	26	ſ	1	9	1	*v*F. *v*S. *i*R. *glb*M.
825	10	39 Lyncis	*p*	12	53	ſ	1	31	1	*v*F. S. R. *b*M. *f* of a S*ft.*
826	—	— —	*p*	5	55	ſ	1	56	1	*v*F. S *r.*
827	—	— —	*f*	2	11	ſ	1	29	1	*e*F. *v*S. *ff* a *v*S*ft.*
828	—	Hyd. L. C. 1039	*p*	2	1	ſ	1	11	2	*e*F. *p*S. R. *vgb*M. Stellar. just *p* a *v*S*ft.*
829	17	27 Lyncis	*p*	23	49	*n*	1	30	1	*e*F. *v*S. R. *b*M.
830	—	— —	*p*	10	40	*n*	1	19	1	*c*F. *p*S. *b*M.
831	—	15 (*f*) Ursæ	*p*	12	8	*n*	0	23	1	*v*F. *v*S.
832	—	— —	*f*	9	39	*n*	0	57	1	*v*F. S. *l*E.
833	—	26 Ursæ	*f*	134	3	ſ	1	43	1	*v*F. *v*S.
834	—	74 Ursæ -	*f*	2	4	ſ	1	56	1	*e*F. S. *i*F.
835	—	77 Ursæ	*f*	82	37	*n*	1	52	1	*e*F. S. E. but nearly R.
836	18	17 Ursæ -	*p*	79	17	ſ	0	33	1	*v*F. *v*S. may be a patch of stars.
837	—	— —	*p*	75	32	ſ	0	40	1	*e*F. *v*S.
838	—	— —	*p*	75	10	ſ	0	15	1	*e*F. *v*S.
839	—	— —	*p*	72	22	ſ	3	40	1	*e*F. *v*S.
840	—	— —	*p*	63	56	ſ	1	28	1	*c*F. *c*S.
841	—	— —	*p*	16	9	ſ	1	9	1	*v*F. S.
842	—	43 Ursæ	*p*	5	8	ſ	0	39	1	*v*F. *v*S. R.
843	—	66 Ursæ -	*p*	19	23	*n*	1	52	1	*v*F. Stellar. *np* a S*ft.*
844	—	— —	*p*	16	1	*n*	2	2	1	*v*F. S. *m*E.
845	—	69 (δ) Ursæ	*p*	4	55	*n*	1	17	1	*v*F. S. E. par.
846	19	20 Ursæ -	*f*	7	53	ſ	2	23	1	*c*F. S. *m*E. very narrow.
847	—	76 Ursæ	*p*	67	53	ſ	2	50	1	*e*F. *v*S. *i*F.
848	—	69 Ursæ Hev.	*p*	19	5	*n*	2	13	1	*v*F. *v*S.
849	—	— —	*f*	23	53	ſ	0	8	1	*v*F. *v*S.
850	20	76 Ursæ -	*p*	26	56	*n*	3	17	1	*v*F. *p*S.

III.	1790.	Stars.		M.	S.		M.	D.	Ob.	Description.
851	Mar. 20	76 Ursæ -	*p*	25	25	*n*	0	43	1	*e*F. S. *i*F.
852	—	— —	*p*	16	38	*n*	2	12	1	*v*F. Stellar, *nf* a S triangle of B*ft*.
853	Apr. 1	30 (φ) Ursæ	*f*	8	55	*n*	1	35	1	*v*F. S. *vglb*M.
854	Oct. 9	72 Pegasi	*f*	15	8	*f*	0	23	2	2*v*S close *ft*. with nebulosity between.
855, 856	—	— —	*f*	27	15	*n*	0	3::	1	Two nebulæ, both *e*F. Stellar. dist. 1′ from 30° *sp* to *nf*.
857	—	σ Fornacis L. C. 285 -	*p*	12	30	*f*	1	54	1	*v*F. S. *i*F. *lb*M.
858	10	6 Pegasi -	*p*	24	40	*n*	0	43	1	*e*F. *p*L. *i*R. *vlb*M. requires great attention to be seen.
859	—	— —	*p*	7	56	*n*	0	17	1	*c*F. *v*S. *i*R. *mb*M. near a *v*S*ft*.
860	Nov. 2	72 Pegasi	*p*	5	19	*n*	1	7	1	*v*F. S. *lb*M.
861	—	— —	*f*	37	50	*f*	0	17	1	*e*F. S.
862	8	1 Lacertæ Hev.	*p*	3	17	*n*	1	19	1	*e*F. *p*L. *i*R. *r*.
863	—	— —	*f*	3	9	*n*	0	48	1	*v*F. *v*S. *mb*M.
864	—	— —	*f*	4	37	*n*	0	50	1	*v*F. S. *m*E. 75° *np ff*. *b*M.
865	13	26 Aurigæ	*p*	1	9	*n*	1	31	1	*v*F. *v*S. R. *b*M.
866	26	29 (π) Androm.	*p*	27	37	*f*	0	20	1	*v*F. *v*S. The *np* corner of a square.
867	Dec. 6	Mayer's Zod. Cat. 20 -	*p*	49	19	*f*	1	39	1	*e*F. *p*S. *i*R. *lb*M.
868	—	— —	*p*	39	35	*f*	0	42	1	*e*F. *p*S. *i*F.
869	25	44 Piscium	*f*	3	25	*n*	0	55	1	*v*F. *v*S. *b*M. *p*. and in the field with II. 854. *nf*. 2. S*ft*.
870	—	— —	*f*	12	48	*n*	0	49	1	*v*F. S. *i*R. *vgb*M.
871	28	Mayer's Zod. Cat. 18 -	*p*	8	1	*n*	1	44	1	*v*F. S. R. *vgb*M.
872	—	— —	*p*	5	52	*n*	0	41	1	*v*F. *v*S. *b*M.
873	—	— —	*p*	5	32	*n*	0	39	1	*e*F. *c*L. In the field with the foregoing, and with II. 860.
874	—	57 Aurigæ	*f*	17	56	*n*	1	50	1	*v*F. *v*S. *l*E.
875	—	— —	*f*	21	42	*f*	0	7	1	*v*F. *v*S.

III.	1790.	Stars.		M.	S.		D.	M.	90.	Description.
876	Dec. 29	51 Piscium	*f*	5	44	*n*	1	43	1	*v*F. *p*L. *i*R. *ſſ* a S*ſt* which is partly involved in the nebulosity.
	1791									
877	Feb. 23	26 Hydræ	*p*	73	56	*n*	0	22	1	*v*F. *i*R. *r*. 2′*d*. almost of equal light throughout.
878	Apr. 2	14 (τ) Ursæ	*f*	9	14	*n*	0	38	2	*v*F. *c*L. R. *mb*M. near 5′*d*.
879	—	73 Ursæ -	*p*	2	39	*ſ*	1	12	1	*c*F. S. *i*F.
880	—	— —	*f*	8	13	*ſ*	1	26	1	*e*F. S.
881	3	35 Ursæ -	*f*	21	51	*u*	0	13	1	*v*F. S.
882	May 6	9 Ursæ min.	*p*	34	52	*ſ*	2	0	1	*v*F. *p*L. R. *b*M.
883	—	13 (γ) Ursæ min.	*f*	42	41	*ſ*	1	36	1	*e*F. *v*S. ver. 300.
884	—	— —	*f*	44	51	*ſ*	2	22	1	*v*F. *v*S. with 300 *c*L.
885	24	37 (ξ) Bootis	*p*	3	44	*ſ*	0	35	1	*e*F. *v*S. E. near par.
886 887	26	7 Serpentis	*p*	15	32	*n*	0	20	1	Two nebulæ, both *e*F. *v*S. the *p* is the most *n*. dist. 1½′.
888	27	19 (ξ) Coronæ	*p*	6	41	*n*	1	7	1	*e*F. *v*S. R. with 300 *p*L.
889	28	17 (σ) Coronæ	*p*	2	1	*ſ*	0	52	1	*v*F. S. R. *vglb*M.
890	—	20 (ν′) Coronæ	*f*	8	9	*n*	1	20	1	*v*F. *p*L. *l*E. *lb*M.
891	30	25 Herculis	*p*	3	41	*n*	0	37	1	*e*F. *v*S. R. *lb*M.
892	—	— —	*p*	2	5	*ſ*	0	9	1	*e*F. S. *b*M.
893	—	44 (η) Herculis	*p*	6	26	*n*	0	8	1	*e*F. vS. *i*F. ver. 300.
	1792									
894	Apr. 20	22 (*f*) Bootis	*f*	12	29	*n*	1	15	1	*v*F. *v*S.
895	—	— —	*f*	12	55	*n*	0	47	1	*v*F. *v*S.
896	—	— —	*f*	16	45	*ſ*	0	25	1	*e*F. S. *vlb*M.
	1793									
897 898	Feb. 4	34 (θ) Gemin.	*p*	1	33	*ſ*	0	31	1	Two nebulæ. The most *n*. and *p*. *e*F. S. The other *e*F. *v*S. dist. 4′.
899	—	— —	*f*	15	18	*n*	1	17	1	*v*F. S. nearly R. *b*M.
900 901	—	— —	*f*	36	21	*n*	0	9	1	Two nebulæ just preceding III. 703. Both *e*F.
902	Mar. 8	18 Navis	*f*	10	36	*n*	0	32	1	*v*F. *l*E. *r*. *b*M.
903	Apr. 6	4 Draconis	*p*	30	43	*n*	0	10	1	*e*F. S. *i*F. *vlb*M.
904	—	— —	*p*	23	25	*n*	0	24	1	*e*F. *v*S. E. mer.

III.	1793.	Stars.		M.	S.		D.	M.	Cl.	Description.
905	Apr. 7	4 Draconis	*p*	37	3	*n*	0	8	1	*e*F. *v*S. ver. 300.
906	—	6 Draconis	*f*	12	31	*n*	1	8	1	*v*F. E. 2′*l*, ½′*b*.
907	—	— —	*f*	16	26	*n*	1	35	1	*v*F. E. *np ff*. 1½′*l*, ½′*b*.
908	—	— —	*f*	23	36	*n*	0	10	1	*e*F. *v*S. *i*R. *vlb*M.
909	—	— —	*f*	39	10	*n*	0	35	1	*v*F. *v*S. R.
910	8	37 Ursæ -	*p*	15	47	*n*	0	19	1	*v*F. *p*L. *i*F. *r*. some of the stars visible.
911	—	— —	*p*	11	47	*s*	0	5	1	*v*F. *c*L. *i*F.
912	—	— —	*f*	0	59	*n*	1	27	1	*e*F. *v*S. ver 300.
913	—	39 Ursæ -	*f*	8	14	*n*	1	14	1	*v*F. *v*S.
914	—	— —	*f*	10	29	*s*	0	2	1	*v*F. S. *l*E.
915	—	— —	*f*	25	35	*n*	0	3	1	*v*F. S.
916	9	42 Ursæ -	*p*	48	48	*n*	0	39	1	*e*F. *v*S. Stellar near a S*st*.
917 }	—	— —	*p*	15	19	*s*	0	44	1	{ Two nebulæ.
918 }				15	10		0	47		{ Both *v*F. *p* S. R. *lb*M.
919	—	— —	*p*	0	1	*n*	2	2	1	*v*F. *v*S. near a *v*S*st*.
920	—	— —	*f*	19	23	*n*	2	1	1	*e*F. *v*S. E. near mer.
921	—	— —	*f*	24	11	*n*	1	22	1	*e*F. *p*L. E.
922	—	— —	*f*	35	14	*n*	1	11	1	*v*F. *v*S. 2*v*S. stars in it.
923	May 5	Hydr. L. C. 1179	*p*	1	25	*n*	0	5	1	*v*F. *v*S. R. *lb*M.
924	—	6 Hydræ conti	*f*	11	2	*s*	1	27	1	*e*F. S. *r*. ver. 300.
925	12	64 Virginis	*f*	1	18	*n*	1	10	1	*c*F. S.
926	—	— —	*f*	13	5	*n*	1	17	1	*v*F. S. *sp*. a *c*B*st*.
927	—	19 Bootis Hev.	*p*	0	20	*n*	0	44	1	*v*F. S.
928	13	93 (τ) Virgin.	*p*	26	17	*s*	0	5	1	*v*F. S.
929	—	— —	*p*	9	25	*n*	0	35	1	*v*F. S. E. mer.
930	Sept. 6	53 Aquarii	*p*	27	19	*n*	0	18	1	*e*F. ver. 300.
931	—	— —	*p*	12	23	*s*	0	19	1	*e*F. S. *i*R.
932	—	— —	*p*	8	50	*n*	1	11	1	*e*F. S. *l*E. *s* of a S*st*. to which it seems almost to be attached, but is free from it. The star is the 1st of 3, making a S triangle.
933	—	— —	*p*	6	7	*n*	0	58	1	*v*F. S. R. *b*M.
934	1794 Apr. 1	Georgian planet	*p*	0	16	*s*	0	2	1	*v*F. This nebula was seen at 9^h 45′, sidereal time, the

III.	1794.	Stars.		M.	S.		D.	M.	Ob.	Description.
										telescope being out of the meridian.
935	Apr. 19	12 (δ) Hydræ crateris -	*f*	15	11	*n*	0	40	1	*e*F. S. *b*M.
936	Oct. 15	5 (α) Cephei	*f*	7	54	*n*	0	16	1	*v*F. *er*,
	1797									
937	Nov. 22	Neb. I. 274	*f*	25	3	*n*	0	53	1	*v*F. S. *i*R. *b*M.
938	Dec. 10	A double st*	*p*	9	5	*n*	0	10	1	*e*F. *p*L. *i*F.* See I. 273.
939	—	— —	*f*	4	0	*ſ*	0	35	1	*e*F. S.
940	12	5 Dracon. Hev.	*p*	32	24	*ſ*	0	49	1	*v*F. S. R. *b*M.
941	—	— —	*p*	8	21	*n*	0	57	1	*v*F. *p*S. 2 S *nf* stars make a triangle with it.
942	—	— —	*f*	4	16	*n*	0	59	1	*e*F. E. near mer. ver. 300.
943, 944	—	5 (*a*) Ursæ mi.	*f*	46	2	*ſ*	0	28	1	Two nebulæ. Both *v*F. *v*S. *r*. dist. 1½′ par.
945	—	35 Draconis	*p*	47	10	*ſ*	1	17	1	*v*F. S. E. *n* of a S*ft*.
946	20	4 (*b*) Ursæ mi.	*p*	29	31	*n*	1	57	1	*v*F. *v*S. R.
947	—	— —	*p*	14	39	*n*	0	42	1	*v*F. *c*L. *i*F. *vlb*M. *ſ* of a *p*B. *ft*.
948	—	— —	*f*	2	20	*n*	1	3	1	*e*F. *v*S. E. near mer.
949	—	— —	*f*	14	44	*n*	2	29	1	*e*F. S. *l*E. near par.
950	—	— —	*f*	24	18	*n*	1	13	1	*v*F. S. *r*. It is preceded by a S. patch of *ft*. which appears almost like this nebula, but more resolved.
951	—	4 Cephei of Bode's Cat.	*p*	21	18	*ſ*	1	25	1	*e*F. S. better with 320.
	1798									
952, 953	Dec. 9	2 (π′) Orionis	*p*	10	20	*ſ*	1	34	1	Two nebulæ within 1′ of each other; mer. Both *v*F. *v*S.
954	10	8 Ceti -	*f*	17	5	*ſ*	1	15	1	*e*F. S.
955	—	21 Ceti -	*p*	3	46	*n*	0	4	1	*c*F. *v*S. *i*R.
956	—	18 (ε) Eridani	*p*	15	21	*ſ*	0	53	1	*v*F. *v*S. 2 or 3′ *n* of 2S*ft*.
	1799									
957, 958	June 29	93 Herculis	*p*	4 3	3 59	*n*	1 1	33 37	1	Two nebulæ. Both *v*F. *v*S.

III.	1799.	Stars.		M.	S.		D.	M.	Cl.	Description.
959	Dec. 19	16 Eridani -	*f*	6	37	*n*	0	26	1	The 2d of 2 *v*F. *v*S. 1½′ *ff*l. 60.
960	—	19 Eridani	*f*	1	19	*n*	1	13	1	*v*F. *v*S. ver. 300.
961	—	— —	*f*	2	43	*n*	0	46	1	*v*F. *v*S.
962	—	— —	*f*	20	51	*n*	1	15	1	*v*F. *v*S. *fp*. 2 *p*B*ft*.
	1801									
963	Apr. 2	208(N)Camelop. of Bode's Cat.	*p*	157	36	*f*	1	16	1	*e*F. S. *i*F.
964	—	— —	*p*	119	54	*f*	3	5	1	*c*F. S. Stellar. ver. 300. just *p. a* S*ft*.
965	—	— —	*p*	117	22	*f*	2	56	1	*v*F. *v*S.
966	—	— —	*p*	118	0	*n*	0	29	1	*v*F. *v*S.
967 } 968 }	—	— —	*p*	72	10	*f*	1	52	1	Two nebulæ. The 1st *v*F. S. The 2d *nf*. the 1st *e*F. *v*S.
969	—	— —	*p*	37	31	*f*	2	39	1	*e*F. S.
970	—	— —	*p*	24	19	*n*	0	28	1	*v*F. *p*L. *r*.
971	—	— —	*p*	20	34	*f*	2	31	1	*e*F. *v*S. R.
972	Nov. 28	50 (α) Ursæ	*p*	5	7	*f*	0	10	1	*v*F. *v*S. R. *b*M.
973	Dec. 6	16 (ζ) Ursæ mi.	*f*	14	15	*n*	1	8	1	*v*F. S. *l*E. mer. *r*.
	1802									
974 } 975 }	Jan. 1	22 (ε) Ursæ mi.	*p*	10	49	*n*	0	37	1	Two nebulæ; the preceding *c*F. S. *b*M. the foll. *v*F. *v*S. it follows the 1st a few seconds, and is 3′ more north.
976	May 21	2 (η) Coronæ	*p*	26	50	*n*	0	2	1	*e*F. S. *i*F.
977	Sep. 26	186 P. Camelop. of Bode's Cat.	*f*	9	49	*f*	1	33	1	*e*F. *v*S. 300 confir.
978	—	— —	*f*	33	19	*f*	0	58	1	*e*F. *p*L. *vlb*M. just *n* of 2 *ft*.

Fourth Class. Planetary Nebulæ.

Stars with Burs, with milky Chevelures, with short Rays, remarkable Shapes, &c.

IV.	1789.	Stars.		M.	S.		D.	M.		Description.
59	Mar. 23	55 Ursæ -	*f*	4	51	*n*	0	23	1	*c*B. S. R. BN. The N is considerably well defined, and the chevelure *v*F.
60	Apr. 12	36 Ursæ -	*f*	8	37	*f*	2	28	2	*vB.* R. Planetary, but very ill defined. The indistinctness on the edges is sufficiently extensive to make this a step between planetary neb. and those which are described *vfmb*M.
61	—	64 (γ) Ursæ	*f*	3	56	*f*	0	19	2	*c*B. B*r*N with *v*FE branches about 30° *np ff*. 7 or 8′*l*, 4 or 5′*b*.
62	14	— —	*f*	2	27	*n*	1	25	1	*c*B. quite R. A large place in the middle is nearly of an equal brightness. Towards the margin it is less bright.
63	24	69 Ursæ Hev.	*f*	1	24	*f*	1	33	1	*c*B. *c*L. *i*R. *er*. *vgmb*M. 4′ diam. I suppose, with a higher power, I might have seen the stars.
64	1790 Mar. 4	6 Navis -	*p*	7	41	*f*	1	2	2	A beautiful planetary nebula, of a considerable degree of brightness; not very well defined, about 12 or 15″ diam.
65	5	28 Monocerotis	*p*	51	49	*n*	0	26	1	A pretty considerable star, 9 or 10m. visibly affected with *v*F. nebulosity, of very little extent all

IV.	1790.	Stars.		M. S.		D. M.	Ob.	Description.
								around. A power of 300 shewed the same, but gave a little more extent to the nebulosity. The 22d Moncerotis was quite free from nebulosity.
66	Mar. 18	17 Ursæ -	*p*	16 29	*f*	3 6	1	A small star with a *p*B. fan-shaped nebula. The star is on the *p* side of the diverging chevelure, and seems to be connected with it.
67	—	66 Ursæ -	*p*	0 39	*n*	1 55	1	*p*B. *p*L. R. The greatest part of it equally B, then fading away *p* suddenly; between 2 and 3′ diam.
68	19	45 Lyncis -	*p*	4 15	*n*	1 44	1	*v*B. S. exactly R. BNM. and *v*F. chev. *vg*. joining to the N. In a lower situation the chev. might not be visible, and this neb. would then appear like an ill defined planetary one.
69	Nov. 30	26 Aurigæ or 31 Hevelii	*p* *f*	88 24 24 59	*f* *f*	0 11 1 26	1	A most singular phenomenon; A *st* 8m. with a faint luminous atmosphere of a circular form, about 3′ in diam. The star is perfectly in the centre, and the atmosphere is so diluted, faint, and equal throughout, that there can be no surmise of its consisting of stars, nor can there be a doubt of the evident connection between the atmosphere and the star.

IV.	1790.	Stars.		M. S.		D. M.	10	Description.
								Another star, not much less in brightness, and in the same field with the above, was perfectly free from any such appearance.
70	1791 Mar. 6	6 Draconis	*f*	50 27	*n*	0 27	2	*c*B. R. almost equally B throughout, resembling a very ill defined planetary neb. about $\frac{1}{2}'$ diam.
71	May 24	37 (ξ) Bootis	*f*	16 5	*f*	0 44	1	A star 7.6m. enveloped in extensive milky nebulosity. Another star 7m. is perfectly free from such appearance.
72	1792 Sep. 15	34 Cygni -	*p*	5 10	*n*	0 23	1	A double star of the 8th magnitude, with a faint south-preceding milky ray joining to it, 8′*l*, and $1\frac{1}{2}'$ broad.
73	1793 Sep. 6	16 (*c*′) Cygni	*f*	2 51	*f*	0 1	1	A bright point, a little extended, like two points close to one another; as bright as a star of the 8.9 magnitude, surrounded by a very bright milky nebulosity suddenly terminated, having the appearance of a planetary nebula with a lucid centre; the border however is not very well defined. It is perfectly round, and I suppose about half a minute in diam. It

IV.	1793.	Stars.		M. S.		M. D.	Of.	Description.
								is of a middle species, between the planetary nebulæ and nebulous stars, and is a beautiful phenomenon.
74	1794 Oct. 18	7 Cephei -	*p*	24 57	*n*	1 22	1	A star 7m. very much affected with nebulosity, which more than fills the field. It seems to extend to at least a degree all around; smaller stars, such as 9 or 10m. of which there are many, are perfectly free from this appearance. A star 7.8m. is perfectly free from this appearance.
75	—	7 Cephei -	*f*	14 40	*f*	0 46	2	Three stars about 9m. involved in nebulosity. The whole takes up a space of about $1\frac{1}{2}'$ diam. other stars of the same size are free from nebulosity.
76	1798 Sept. 9	3 (η) Cephei	*p*	10 31	*f*	1 36	1	*c*F. *v*L. *i*F. a sort of BNM. The nebulosity 6 or 7′. The N seems to consist of stars, the nebulosity is of the milky kind. It is a pretty object.
77	Dec. 19	16 Eridani -	*f*	4 56	*n*	0 14	1	A star about 9 or 10m. with a nebulous ray to the south-preceding side. The ray is about $1\frac{1}{2}'$ long. The star may not be connected with it.

IV.	1801.	Stars.		M.	S.		D.	M.	Ob.	Description.
78	Nov. 8	8 Ursæ min. of Bode's Cat.	*p*	25	0	*n*	0	12	1	cB. R. about $1\frac{1}{2}'$ diam. Somewhat approaching to a planetary nebula, with a strong hazy border.

Fifth Class. Very large Nebulæ.

V.	1789.	Stars.		M.	S.		M.	D.	Ob.	Description.
45	Apr. 12	64 (γ) Ursæ -	*f*	0	9	*f*	1	23	2	cB. *i*F. E. mer. LBN. with F. branches 7 or 8'*l*, 5 or 6'*b*.
46	17	48 (β) Ursæ	*f*	10	4	*f*	0	41	2	*v*B. *m*E. *r*. 10'*l*, 2'*b*. There is an unconnected pretty bright star in the middle.
	1790									
47	April 1	30 (φ) Ursæ	*f*	10	9	*n*	1	39	1	*v*B. *m*E. *np ff*. *vgmb*M. 8'*l*, 2'*b*.
48	Oct. 9	ι Fornacis L. C. 182 - -	*f*	8	7	*f*	0	2	1	*v*B. E. 75° *np ff*. 8' long. A very bright nucleus, confined to a small part, or about 1' diam.
49	Dec. 28	41 Persei Hev.	*f*	22	0	*n*	0	15	1	6 or 7 small stars, with faint nebulosity between them, of considerable extent, and of an irregular figure.
	1793									
50	Mar. 4	ε Pixidis Na. L. C. 831 -	*f*	35	26	*f*	0	43	1	*v*F. *v*S. *l*E. 15° *fp nf*. *lb*M. 8'*l*, 5 or 6'*b*.
51	April 6	4 Draconis -	*p*	14	48	*n*	0	20	2	*v*F. *m*E. 70° *np ff*. About 25'*l*, and losing itself imperceptibly, about 6 or 7' broad.

V.	1801.	Stars.		M.	S.		D.	M.	Obs.	Description.
52	Nov. 28	50 (α) Ursæ	*p*	17	49	*n*	1	30	1	*c*B. E. mer. *vgb*M. About 5′*l*. and 3′ broad; the nebulosity seems to be of the milky kind; it loses itself imperceptibly all around. The whole breadth of the sweep seems to be affected with very faint nebulosity.

Sixth Class. Very compressed and rich Clusters of Stars.

Additional Abbreviations. cl. *Cluster*, com. *compressed*, sc. *scattered*, co. *coarsely*.

VI.	1790.	Stars.		M.	S.		D.	M.	Obs.	Description.
36	Mar. 4	6 Navis -	*p*	8	45	*f*	1	55	2	A *v*. com. cl. of S, and some L*st*. E near mer. The most compressed part is about 8′*l*, and 2′*b*. with many scattered to a considerable distance.
37	1791 Feb. 23	26 Hydræ -	*p*	79	30	*n*	1	0	1	A v. com. and very rich cl. of stars. The stars are of 2 sizes, some considerably L. and the rest next to invisible. The com. part 5 or 6′ in diam.
38	Aug. 25	50 (γ) Aquilæ	*p*	14	50	*f*	1	18	1	*c*B. S. *i*F. *er*. Some of the *st*. are visible.
39	1793 Mar. 3	ζ Pixidis Naut. L. C. 777 -	*p*	20	39	*f*	0	19	2	A cl. of L*st*. considerably rich *i*R. above 15′ diam.

VI.	1793.	Stars.		M.	S.		D.	M.	Class	Description.
40	May 12	53 (ν) Serpentis	*p*	48	17	*n*	0	2	1	A very beautiful *e* com. cl. of *ſt.* extremely rich, 5 or 6′ in diam. gradually more compressed towards the centre.
41	1797 Dec. 12	35 Draconis -	*p*	22	6	*ſ*	1	7	1	R. *r.* about 3′ diam. *vgb*M. I suppose it to be a cluster of stars extremely compressed. 300 confirms the supposition, and shews a few of the stars; it must be immensely rich.
42	1798 Sep. 9	3 (η) Cephei	*p*	13	26	*ſ*	1	6	1	A beautiful compressed cl. of S*ſt.* extr. rich, of an *i*F. The preceding part of it is round, and branching out on the following side, both towards the *n.* and towards the *ſ.* 8 or 9′ in diam.

Seventh Class. Pretty much compressed Clusters of large or small Stars.

VII.	1788.	Stars.		M.	S.		D.	M.	Class	Description.
56	Dec. 16	11 (β) Cassiop	*p*	9	57	*n*	2	6	1	A *p.* com. cl. of S*ſt.* of several sizes, cons. rich. E. near par. 5 or 6′*l.*
57	31	40 Aurigæ -	*f*	8	28	*n*	1	25	1	A compressed cl. of *v*S stars *i*F. 6′ diam. consid. rich.
58	1790 Mar. 4	6 Navis -	*f*	5	18	*ſ*	0	29	1	A *p.* com. and rich cl. of S stars *i*R. 7 or 8′ diam.
59	Sept. 11	18 (δ) Cygni	*f*	18	38	*ſ*	1	4	1	A *v.* rich cl. of L*ſt.* considerably compressed, above

VII.	1790.	Stars.		M. S.		D. M.	Ob.	Description.
								15′ diam. by the size of the *st.* it is situated in the milky-way, towards us.
60	Dec. 28	47 (λ) Persei	*f*	3 30	*s*	0 50	1	A L. cl. of *c*L *st. p.* com. and very rich. *i*R. 7′ diam.
61	—	41 Persei Hev.	*p*	3 8	*n*	0 56	1	A beautiful cl. of L *st. v* rich, and considerably com. about 15′ diam.
62	1791 Aug. 21	19 Aquilæ -	*p*	0 26	*s*	1 24	1	A S. *p.* com. cl. of stars not very rich.
63	1793 Mar. 3	ζ Pixidis Naut. L. C. 777 -	*p*	2 25	*s*	0 24	2	A L. cl. of scattered S *st. i* F. considerably rich.
64	4	— —	*p*	20 55	*s*	1 9	1	A L. cl. of *st.* of a middling size. *i* E. considerably rich. The stars are chiefly in rows.
65	8	2 Navis -	*p*	16 10	*n*	0 38	1	A S. cl. of *v*S *st.* considerably rich and compressed.
66	1794 Oct. 18	7 Cephei -	*f*	16 45	*s*	1 7	2	A cl. of cons. com. *v*S and L. stars about 12′ diam. considerably rich.
67	1799 Jan. 30	15 (π′) Canis	*f*	42 33	*s*	0 14	2	A cl. of com. stars, considerably rich.

Eighth Class. Coarsely scattered Clusters of Stars.

VIII	1788.	Stars.		M.	S.		D.	M.	·ᵒ	Description.
79	Dec. 16	11 (β) Cassiop	*f*	20	35	*n*	1	5	1	A coarsely sc. cl. of L*st.* mixed with smaller ones, not very rich.
80	18	1 Camelopar.	*p*	41	36	*s*	1	29	1	A cl. of S. stars, containing one large one, 10; 9m. 2 or 3′ diam. not rich.
	1789									
81	July 18	5 Vulpeculæ	*p*	2	46	*n*	2	4	1	A sc. cl. of *c*L*st.* *i*F. pretty rich, above 15′ in extent.
	1790									
82	Sept. 11	57 Cygni -	*f*	1	0	*n*	0	52	1	A L. cl. of *p*S. stars of several sizes.
83	30	51 Cygni -	*p*	25	24	*s*	0	1	1	A cl. of sc. stars, above 15′ diam. pretty rich, joining to the milky-way, or a projecting part of it.
84	Dec. 28	33 (α) Persei	*f*	9	14	*n*	1	36	1	A cl. of S*st.* not very rich.
85	—	41 Persei Hev.	*f*	2	42	*s*	0	2	1	A coarsely sc. cl. of L*st.* pretty rich.
	1792									
86	Sept. 15	34 Cygni -	*p*	9	43	*n*	0	15	1	A coarsely sc. cl. of L stars, of a right-angled triangular shape.
	1793									
87	Mar. 8	2 Navis -	*p*	7	10	*s*	0	15	1	A small cl. of S. stars, not very rich.
	1799									
88	Dec. 28	46 (ξ) Persei	*p*	27	13	*n*	1	29	2	A cl. of coarsely sc. L*st.* about 15′ diam.