A

# HAND-BOOK,

DESCRIBING OBJECTS IN THE

# "Telescopic Pictures of the Moon,"

BY HENRY HARRISON.

*Compiled from the Best and Latest Authorities, with Additions of the Author's own Observations; adapted for Educational purposes.*

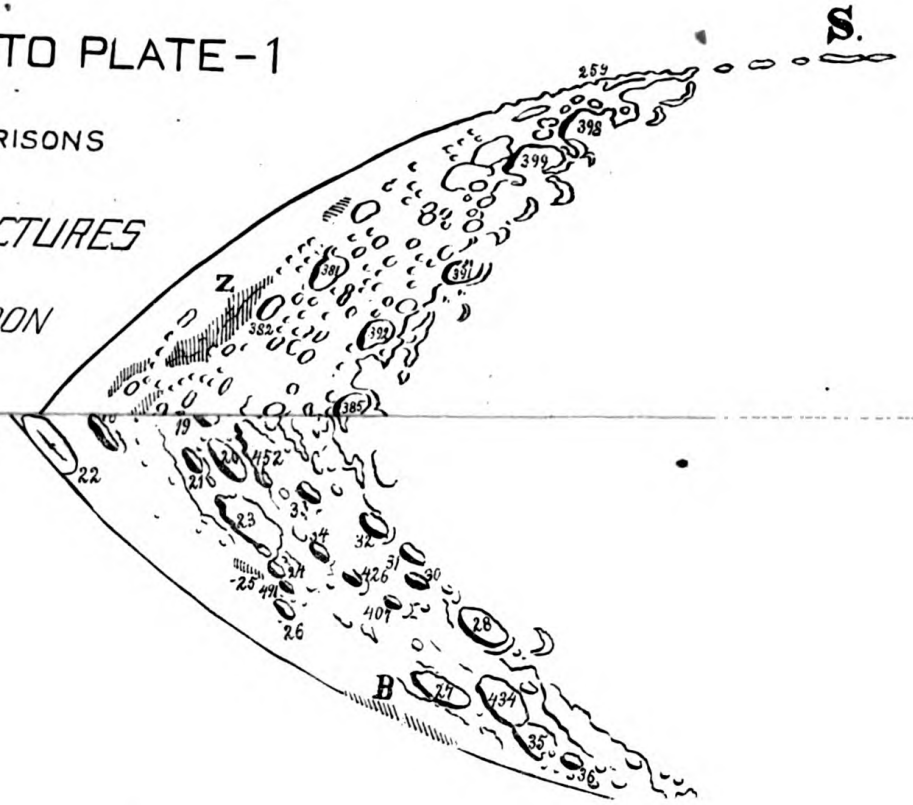
NEW YORK:
PUBLISHED BY THE AUTHOR.
1880.

# OUTLINE MAP TO PLATE-1

OF HENRY HARRISONS

## TELESCOPIC PICTURES

OF THE MOON



A

# HAND-BOOK,

DESCRIBING OBJECTS IN THE

# "Telescopic Pictures of the Moon,"

BY HENRY HARRISON.

*Compiled from the Best and Latest Authorities, with Additions of the Author's own Observations; adapted for Educational purposes.*

NEW YORK:
PUBLISHED BY THE AUTHOR.
1880.

To my friend,

GEORGE B. ARNOLD,

in recognition of his valuable advice and tuition during my astronomical studies, I gratefully and respectfully inscribe this work.

HENRY HARRISON.

# INTRODUCTION.

The intention of the following pages is to furnish a brief description to accompany my "Telescopic Pictures of the Moon."

Several years ago the desire to study astronomy practically, induced me to become the possessor of a telescope, and with its aid I scanned the entire northern heavens, studying the beautiful clusters, the mysterious nebulæ, the planetary system and the twinkling stars—when finally I turned my close attention to the moon, our faithful escort and nearest neighbor, and therefore the most interesting object for telescopic study.

For the purpose of acquiring a thorough knowledge of the depths of craters, heights of walls and mountains, and dimensions of mares and plains on the moon's surface, the earlier astronomers have furnished us with topographical maps and excellent text-books.

Galileo, Scheiner, Langrenus, Hevelius and Riccioli were the first selenographers. They were followed by Cassini, Leibnitz, Bernouilli and Lalande. In the year 1791, Schröter published his "Selenographic Fragments," containing a number of engravings of the appearance of lunar formations. To him selenography is indebted for an indefatigable faithfulness and perseverance throughout numerous measurements and roughly-drawn sketches which, imperfect on account of deficiency of apparatus, spurred Beer and Mädler, in later years, to greater precautions, by means of which they so thoroughly succeeded in completing their great work, "Der Mond," with its accompanying chart, the "Mappa Selenographica." This is considered the greatest contribution to selenography—full of topographical details, founded on thirty-seven years' observations.

Schröter was followed by Lohrmann in lunar topography, and lastly Schmidt, of Athens turned his attention to the production of a map of the moon, seventy-five inches in diameter, for which he made a series of over a thousand drawings and over three thousand measurements.

As a good map and a descriptive hand-book are a necessary adjunct to the study of this subject, I procured several of the most reliable works, but soon learned that although the descriptive parts were ad-

mirable, the maps were not sufficiently true to nature to facilitate comparison and give readiness in finding objects.

The gigantic outline maps above mentioned are undoubtedly useful for topographical studies, but, as a beginner and student, I found them very perplexing; the innumerable lines and the absence of the natural shading were so confusing that the best draughtsman would lose much valuable time in his efforts to decipher them.

The moon has also been the object of photographic study. De Larue, Henry Draper, and especially Lewis M. Rutherford, have rendered admirable productions in this branch of science. These photographs are generally considered absolutely correct representations of undoubted topographical merit, and very successful additions to photographic and astronomical science. But although of high excellence, they lack distinctness, light, and, of course, color. The beautiful gradations of light and shade, the so-called twilight on and near the terminator, the details in the mares and the long shadows of mountains, and of detached masses and solitary pyramids scattered here and there upon the plains, are mostly lost.

The plastic artists have also labored with considerable skill in this field. Russell, in 1781; Mme. Maedler, Frau Hofräthin Witte, in Hanover; Mr. Boyle, in New York; Dickert, under Schmidt's directions, in Bonn, and Sir Charles Wren, when Savilian Professor at Oxford, made lunar globes in relief, the latter at the request of the Royal Society and by command of Charles II. This is said to be the most beautiful production of which the plastic art is capable; it is therefore to be hoped that it has been carefully preserved.

In Neison's book, "The Moon," are several colored lithographs, the craters *Copernicus*, *Plato*, *Godin* and *Agrippa*. They are not very picturesque, and, for their large dimensions, lack detail. Nasmyth and Carpenter's work on the moon possesses some of the finest and most picturesque representations of portions of the lunar surface; they are photographs from plaster models of objects highly magnified, with an immense amount of detail, the result of thirty years' labor.

But neither the maps, photographs, models, nor the colored lithographs, satisfied my ideas of lunar representation. It occurred to me that something *still more* life-like could be produced. I therefore resolved to test my skill in selenography, and made the moon the subject of a study for a portrait in colors, as seen with a low power, thereby

bringing the whole surface into one picture. The long sittings did not seem to fatigue her, and with a little skill and patient observation of her most striking characteristics, such as illumination and color, I completed the "Three-days-old Crescent," which, when exhibited to the public, I am happy to say, won the admiration of professional and amateur astronomers, and all interested in natural sciences. So satisfactory was the result of my labors, that I was persuaded to have the picture reproduced in colored lithographs, which I now respectfully recommend to the reader. The picture is twenty-four inches square, with the image of the moon eighteen inches in diameter, and represents the terminator at the crater *Messier*. It shows the earth-shine on the surface in shadow, in which some of the most prominent objects, the craters Copernicus, Aristarchus and Tycho, the Appenine Mountains, and nearly all the mares are visible. It is surrounded by a dark blue background, the color of the field in the telescope an hour after sunset. Five other pictures, of the most interesting phases, will complete the work, viz., "*Five Days Old;*" with terminator at the ring plain *Katharina ;* "*First Quarter*," "*Last Quarter*," "*Sunset at Copernicus,*" and finally "*The Last Three Days of the Old Moon,*" terminator at Aristarchus.*

Each of these pictures will be accompanied by an outline drawing and a description which has been briefly but carefully compiled from the latest authorities, with additions of my own observations. In it I mention, first, the name of the object, then its number as given on the outline map, and, in Roman letters, its authority.

In conclusion, I wish particularly to state that, although these pictures are intended to be as life-like and faithful representations of nature as can be produced, they do not pretend to show all the innumerable and wonderful details, which the telescope reveals to us, of the lunar surface. These minor details are omitted, not from lack of patience, but because of the small dimensions of the pictures. My desire was to make them six feet in diameter, as they ought to have been in order to introduce every formation, but this would have rendered reproduction impossible.

*New York, November*, 1880.

---

* My original plan was to give phases only two days apart from the "Three-days-old-Crescent" to "Full ;" but I deem this an improvement, thus avoiding valueless repetition, and still bringing every object on the moon in view.

# ABBREVIATIONS.

*B.*—Birt. *B. and M.*—Beer and Maedler. *G.*—Gruithuisen. *H.*—Hevelius. *L.*—Lee. *Lo.*—Lohrmann. *M.*—Maedler. *N.*—Neison. *R.*—Riccioli. *S.*—Schroeter. *Schm.*—Schmidt. *W.*—Webb. *O. T.*—On Terminator.

**When an object is directly on the terminator, and not mentioned, it will be described with the next plate.**

# CONTENTS.

# PLATE I.

MARE CRISIUM. A, (R.)—An elliptical dark, greenish-grey plain, whose dimensions are 281 miles from north to south, and 355 miles from east to west, in which direction lies its greater axis; being foreshortened it appears *vice versa*. It contains 78,000 square miles, and is the smallest of all *enclosed* plains; the surface is very deeply depressed; on it are several small craters, minute bright dots and streaks of light, and delicate greyish-white lines. The western border of the mare is mostly free from terraces, but contains some very high peaks which are best seen, (casting their long shadows on the plain) one and a half days after New; but the southern, northern and eastern enclosures consist of lofty peaks and precipitous mountains, of which the Promontorium Agarum (1.) rises nearly 11,000 feet, and a mountain southeast of Picard, (4.) at the entrance of a pass, 15,000 feet above the level; rivaling, as W. says, our Mont Blanc. The border here is formed of large masses of steep mountains, projecting into the mare, and possessing some very interesting characteristics. Three days after Full I have obtained a beautiful view of A. when the broad, black shadows of the border were thrown across the plain. The northern border of the mare consists of triangular plateaux which are pierced by narrow valleys, and which contain a number of craters and depressions, some deep, but most shallow.

PICARD 4, (S.)—The largest ring-plain on Mare Crisium, a little over 21 miles in diameter; its ring rises 3050 feet above the exterior, on the west, and 5300 feet above the interior, which has a low central mountain north, and a little to the east is a smaller crater, Picard A, which has a minute interior crater, discovered by Schm. and by W. called a "test object." Picard A is deeper and steeper than Picard, its walls rising 3200 feet above the mare, and 7000 feet above its interior, and has a central peak, difficult to detect. To the north is a still smaller and deeper ring-plain, with a slight

central mountain, which is perceptible only under the most favorable conditions.

PROMONTORIUM AGARUM, 1 (H.) or, CAPE AGARUM. The point, on the southwest border of Mare Crisium, which extends farthest into the same; its greatest height is nearly 11,000 feet, whilst the plateau is only 5700 feet high; it is very steep at the base and slopes toward the summit. On July 12th, 1877, (46 hours after New,) a magnificent view was obtained of this object, it being on this night very near the terminator with its long black shadows, vanishing, across a small portion of the Mare Crisium, into midnight.

SCHUBERT 10, (M.)—A ring-plain near, and sometimes on the western limb, 46 miles in diameter, with a small central elevation on its floor; the eastern walls are somewhat higher than the western. Being near the limb, this plain is difficult for observation.*

APPOLONIUS 8 (M.)—A ring-plain 30 miles in diameter; the southeastern wall rises 5432 feet above the floor, whilst its western wall is broken by a small crater. The regions southeast from Appolonius are very mountainous, having between them great valleys, clefts and bays, one of which, directly southeast of the Mare Crisium, forms the curious shape of a star. The floor of this plain is dark in Full.

TARANTIUS 326, (R.) O. T.—A ring-plain, almost circular and nearly 44 miles at its greatest diameter; its broken terraced walls on the east are 3485 feet high, surrounding which are some ridges extending far into the Mare Fœcunditatis.

FIRMICUS 7, (R.)—A ring-plain 38¾ miles in diameter, whose floor is not unlike that of Appalonius; it is connected with Azout by a mountain arm, southwest of which are several small, but deep craters. Between Firmicus and the western limb, are the dark streaks (Palus Amaræ) (H) in which B. and M. discovered singular variations of color, which they attributed to processes of vegetation; the streaks are steel-grey, and at times, under peculiar illuminations, dark greenish-grey and pink.

NEPER 9, (S.)—A walled-plain close to the limb, 74 miles in diameter, with a central mountain ridge from north to south. East and northeast from Neper are several minute craters.

---

* Owing to the strong illumination near and on the limb and the natural foreshortening, some detail had to be omitted to preserve rotundity.

AZOUT 6, (S.)—A small ring-plain, the northwestern terminus of a long cleft extending south-east close to Appolonius. It is 16 miles in diameter, and has a very small central elevation and a dark-grey floor.

CONDORCET 5, (S.)—A large ring-plain southwest from the Promontorium Agarum, 45 miles in diameter; its walls rise from 8850 feet to 8950 feet above the grey floor, which seems curved from east to west.

HANSEN 11, (M.)—A deep ring-plain 32½ miles in diameter, whose steep walls rise into peaks on the north; a small bright crater to the west is situated near the border of a steel-grey valley, 115 miles long and easily seen; another small crater, still farther west, is somewhat larger than Hansen and lies between the above valley and another grey plain; southeast of Hansen and close to the walls of Condorcet, is a bright, incomplete ring mountain, not easily seen by N. I have seen it plainly two days after New.

PROMONTORIUM LAVINIUM 450, (B.)—A lofty point near the centre of the eastern border of the Mare Crisium, guarding the entrance of a large pass; it has several small craters on its plateau.

PROMONTORIUM OLIVIUM 451, (B.)—A lofty point directly north of the Promontorium Lavinium; its plateau contains also a small crater.

ALHAZEN 2, (M.)—This ring-plain is situated north of Hansen; it has a diameter of 28 miles. It is surrounded by valleys and plains containing some peaks of considerable height; one of these peaks to the northeast of Alhazen on the Mare Crisium is encircled by several other peaks of remarkable symmetry. Directly north of this peak lies the Alhazen of Schrœter, 23 miles in diameter, and being lost to Kunowski in 1825. M. transferred the name to the present formation. In 1862 B. recovered it as a valley, and in 1867 saw in it a depressed ring-plain corresponding to Schrœter's description. N. remarks that the discrepancy between the present rare visibility of this object and the description of Schrœter still requires explanation before the question can be considered to have received a satisfactory solution.

PROCLUS 60, (R.) O. T.—A crater-plain a little over 18 miles in diameter, whose walls rise on the east 7700 feet, and on the west 8300 feet above its interior. I have viewed this crater under different powers for hours in succession and under all illuminations, for the purpose

of discovering a central elevation, but in vain.* Proclus is the most brilliant crater on the moon's surface and resembles a drop of mercury on a white satin ground on which the sun shines, (being on the terminator its brilliancy is of course not represented.) It is the centre of a number of bright streaks running southwest and northeast, and bordering on the Palus Somnii, upon which it has a very peculiar effect, to be further described hereafter.

EIMMART 3, (S.)—A small ring-crater on the northwestern border of the Mare Crisium, with a bright eastern wall 10,333 feet high. Surrounding this crater are several high plateaux with long winding valleys.

ORIANI 14, (M.)—A ring-plain of considerable depth and 32 miles in diameter; east of it is a steep plateau containing a high peak, overlooking a valley on the south, and on the north extend massive mountains.

PLUTARCH 15, (R.)—This ring-plain is often on the limb showing then its central mountains, which appear very much broken; to the west, long mountain ranges of considerable height extend around the limb to the other side of the moon.

SENECA 16, (R.)—A ring-plain of some dimensions, with a high western peaked wall. Between Oriani, Plutarch and Seneca is a considerable, though much foreshortened, bright plain. (N.)

CLEOMEDES 12, (R.)—A plain 78 miles in diameter, with massive walls rising 8700 feet on the west, and 9700 feet on the east above its floor, which contains several small craters south of its centre, and a bright mountain in three peaks. S. mentions observed variations in the interior, which however, is denied by W. and B.;—G., B. and M., S. and L. have respectively observed objects, which more recently could not be recovered. West, is a small ring-plain one and a half miles in diameter, and a number of craters may be found on its eastern terrace.

TRALLES 13, (M.)—A small crater on the northeast wall of Cleomedes; it is deep and precipitous, and the summit of the eastern wall rises 13,700 feet above the dark floor, which has a central mountain; the wall contains several small craters.

---

* N. thinks it possible that Proclus contains a central mountain.

BURCKHARDT 19, (M.)—A large, peculiar-shaped plain 35 miles in diameter, (somewhat resembling Cleomedes in outline,) whose bright, steep, eastern walls rise nearly 12,700 feet above the floor, which contains a large central mountain; west is a small ring-plain.

HAHN 17, (M.)—A circular ring-plain 46 miles in diameter; its steep wall has heavy, high peaks, some 9690 feet above the floor; in consequence of which a large portion of the floor is invisible to us.

MACROBIUS 59, (R.) O. T.—A noble ring-plain, nearly 42 miles in diameter, with a bright interior containing a central mountain and other irregularities. Its walls are from 10,500 feet to 13,000 feet high, and on the eastern part of the ring is a small, bright crater. West of Macrobius is a ring-plain very similar in general character, but inferior in brightness.

BEROSUS 18, (R.)—A ring-plain with a small central mountain. The western wall has a height of 11,427 feet, and on the eastern wall are two peaks of greater height.

GEMINUS 20, (R.)—A beautiful ring-plain, 54 miles in diameter. Its rings are very steep, terraced, and rise on the east 12,400 feet; on the west, 15,700 feet above the interior floor, on which are a number of central mountains.

BERNOUILLI 21, (S.)—A very deep ring-plain with precipitous walls rising on the east about 12,700 feet above the floor, which is almost level.

GAUSS 22, (M.)—A large walled plain near the western limb, resembling an ellipse because of its fore-shortening. It has lofty walls with high peaks, and a chain of remarkable central mountains which, according to W., at times command a glorious view across a plain of 50 miles, shrouded with darkness, to the illuminated peaks all around the horizon, above which the sun on one side, the earth on the other, are slowly rising. B. and M. describe a beautiful effect of sunset upon the ring of this plain.

PROMONTORIUM ARCHIDÆUM 452, (B.)—A long mountain range, northeast of Gemini and between it and the ring-plain Berzelius. Its greatest height is 2500 feet.

BERZELIUS 33, (M.)—A regular ring-plain with many moderate-sized peaks and projections on its walls, which rise from 1000 feet to 1300 feet above the interior. The central peak is very low and scarcely visible on the bright interior. On the plain west of Berzelius is a twin

crater-pit—a nearly solitary instance here. Southeast of Berzelius, in the mountains, are a number of very high peaks in the midst of a complex valley system, probably all nearly 10,000 feet high.

TAURUS MOUNTAINS 51, (H.)—A monotonous mass of highlands, extending from Geminus and Berzelius to Littrow and Maraldi. Its highest peaks are probably 10,000 feet high. Where the number stands is a high mountain with a crater on its peak. (Tralles A. of N.)

MESSALA 23, (R.)—A fine, walled plain, 69 miles in diameter, the interior of which seems somewhat deeper than the exterior surface. Its walls consist of high ridges, and are from 3000 feet to 3600 feet high. On the west are two conspicuous ring-plains, very shallow, the northern one having a central mountain.

FRANKLIN 32, (M.) O. T.—A deep ring-plain, 33 miles in diameter, whose walls on the east rise 7800 feet, and on the west 8700 feet above the dark floor, which has a central elevation.

HOOKE 34, (S.)—A plain, irregular in form, 28 miles in diameter. Southwest of it is a small crater, 6500 feet deep, and north of it are some mountains on a plain, of which some are very high.

SCHUMACHER 24, (M.)—An irregular ring-plain, 37 miles in diameter, with very high eastern walls.

STRUVE 25, (M.)—A dark-grey depression, not entirely enclosed, west of Schumacher. Its western enclosure contains a number of low ridges with one or two high points. It is easily detected.

CARINGTON 491, (B.) (Schumacher A. of M.)—A small, irregular ring-plain, northwest of Schumacher, with no distinct peculiarities.

CEPHEUS 31, (R.) O. T.—A circular ring-plain, 27 miles in diameter, whose highest walls on the east rise 9200 feet above the interior, which has a small central elevation. On the western wall is a small, bright crater; another east of it, on the eastern slope of a pear-shaped dark valley, not visible on Plate I.

SCHUCKBURGH 426, (L.) (Hooke b. M.)—A slightly-depressed plain, with its southern diameter greater than its northern. N. calls it very triangular. The mountainous enclosure rises 3250 feet above the interior.

OERSTED 30 (M.) O. T.—This formation is very regular, and is surrounded by a wall 1000 feet high. The floor has a central elevation or hill 400 feet high, north of which is a minute crater.

MERCURIUS 26, (B.)—A ring-plain, 25 miles in diameter, whose wall

contains six small peaks and rises nearly 7700 feet above the floor, which contains a central ridge. N. sees the remains of a large plain, similar to Gauss, partially destroyed by the latter formation. East of Mercurius are some peaked mountains and a small, pear-shaped plain, and from this toward Endymion extends a row of mountains, 2000 feet high.

CHEVALLIER 407, (L.)—A shallow ring-plain, not very conspicuous, whose floor is very bright, and contains some low hills and a deep crater, which M. designates as "Atlas b."

ATLAS 28, (R.) O. T.—A large ring-plain, nearly 55 miles in diameter, whose terraced walls rise on the west 8900 feet, on the north 10,950 feet, and on the east 10,445 feet above the floor, which contains a row of elevations. North is a partly-enclosed, shallow plain, west a deep crater, and east rise the walls of the magnificent ring-plain Hercules.

ENDYMION 27, (R.)—This ring-plain is one of the finest in that region of the moon's surface, but, owing to its position near the limb, unfavorable for study. It is 78 miles in diameter, nearly circular, and its beautifully-terraced walls rise 10,350 feet on the east, 10,156 feet on the north, 7565 feet on the south, and 15,309 feet on the west—overtopping all but the very highest peaks of our Alps, W.—above the floor, which undergoes remarkable changes of brightness according to libration. It is surrounded on the west by peaks and irregular mountain ridges, which extend as far northeast as Strabo and are nearly 200 miles in length.

MARE HUMBOLDTIANUM B, (M.)—A dark plain north of Endymion, and rather unfavorably situated for study, excepting when the moon librates toward the southeast, at which time peaks become visible, rising from 13,000 feet to 16,000 feet above the crest of the wall. It is 191 miles long, 254 miles in breadth, and extends perhaps 300 miles farther west, possessing an area of 40,000 square miles, more than half as large as the Mare Crisium. In 1863 Key discovered two singular flattenings on the southeastern part of the plain, divided by a ridge, the southern division extending for 10 degrees, which I have seen twice within three years. These flattenings are very plain to a close observer.

DE LA RUE 434, (B.)—An irregular, shallow, walled plain, southeast of Endymion and connected with it by a mountain chain, which

contains two small craters. On the east a mountain chain extends south, passing a deep crater-plain, to Hercules. De La Rue is not entirely enclosed.

STRABO 35, (M.)—A walled plain, 32 miles in diameter with several high peaks on its western wall. Northwest is a mountain chain containing some small craters and a high peak which rises 10,743 feet above the floor.

THALES 36, (R.)—A deep and precipitous crater-plain with several small ring-plains north of it. A little to the west of north are some very bright peaks, and three small craters may be found on a line from east to west, close to the limb north of Thales.

MARE FŒCUNDITATIS X, (R.)—This largest of all the western mares extends north and south of the moon's equator. It has a length of 415 miles, and a width of 640. From north to south it is crossed by many light streaks and ridges, and contains some small ring-plains and craters, among which are the three ring-plains Bellot, Crozier and McClure, west of which are the noble terraces of Vendelinus. Here the mare has a width of only 132 miles; farther south it becomes wider and narrows again to a width of 70 miles, and penetrates, narrowing still more, into the southern mountain region.

MESSIER 327, (M.) O. T.—Close to the terminator in the Mare Fœcunditatis, lies this curious object. It is a small, oval crater-plain, nine miles in diameter from east to west. East of it is a brother crater which M. describes as being at one time exactly like the other in depth, height, form, color and position of its wall, but which is at present an entirely different object. G. discovered a slight difference in 1842. Later, W. was the first to point out the importance of this, and I quote his words: "This similarity no longer exists, and we have here strong evidence of *modern physical change*. Two curious white streaks, slightly divergent, extend from Messier A. for a long distance east, forming, with the included shade, the picture of a comet's tail. G., who imagined them to be artificial, states that they are composed of a multitude of distinct parallel lines. In consequence of an observation by S., who discovered this 'comet,' B. and M. fortunately examined this spot, so peculiarly calculated to exhibit any variation, *more than three hundred times* between 1829 and 1837, without noticing any change. In 1855, November 14th, I perceived with my three and seven-tenths-inch achromatic that the eastern crater appeared the

larger of the two. March 11th, 1856, I found the western crater not only the lesser, but 'lengthened obviously in an east and west direction.' I have since discovered the dissimilarity with larger instruments, and it is, in fact, matter of very easy observation."—(W., p. 116.) A better view of this double crater will be furnished on Plate II.

MACLAURIN 346, (M.)—A ring-plain with a central mountain, west of the Mare Fœcunditatis, and south of the largest dark valley in that region. Its walls are of moderate height.

MARE SMITHII 424, (L.)—A great plain on the western limb, best observed during a strong easterly libration, at which time it presents considerable flattenings not unlike the Mare Humboldtianum. It is not visible as a connected mare even under the most favorable illuminations, and appears on Plate I. in dark, disconnected spots.

WEBB 346 A., (N.)—A very bright, small ring-plain, 14 miles in diameter, with a dark floor and central peak. South of it is a smaller crater, and both are surrounded by low hills.

KÆSTNER 347, (S.)—A walled plain south of the Mare Smithii, from which it is separated by a low border. North of it is a small ring-plain, and some still smaller on the west and south, and one on its eastern wall.

LANGRENUS 338, (R.)—A superb walled plain on the western border of the Mare Fœcunditatis. It has a bright, convex floor containing a central peak, very brilliant, and rising 3344 feet in height. (Schm., 5800 feet.) The eastern wall rises 9611 feet, and the southeastern to more than 15,000 feet in height (Schm.) Langrenus is surrounded by mountains and hills. Northeast, on the mare, are three ring-plains, 492, 493 and 494 (Langrenus f., B. and K. of M.) 493 contains a pair of central peaks, and the walls of 492 rise 5640 feet above its interior. The first large ring-plain west of Langrenus contains a central peak scarcely visible, and its lofty walls rise 11,490 feet above its floor. Some bright streaks extend from the eastern wall of Langrenus, in a direction east, northeast and southeast, into the mare.

LAPEIROUSE 348, (M.)—A ring-plain, 41 miles in diameter, with narrow walls rising on the southwest in peaks. Its floor is level and has two ridges and a small crater. East of Lapeirouse is a fine ring-plain with broad, lofty walls, rising 12,546 feet above the floor, which contains a long ridge and a central peak.

ANSGARIUS 349, (M.)—A ring-plain, 50 miles in diameter, enclosed

by a wall rising in lofty peaks on the east and southwest. Its floor is perfectly level. South are some small crater-like formations.

BEHAIM 350, (M.)—An irregular ring-plain, 65 miles in diameter, with steep walls rising into peaks on the west and east. Its interior seems divided into two parts by a cross-wall (N.) When on the limb this wall has been estimated from 12,000 feet to 15,000 feet high. Between Behaim and Vandelinus is a deep ring-plain with a bright crater on its floor.

VANDELINUS 339, (R.)—A large, irregular plain, with moderately high walls, rising on the east from 4600 feet to 5378 feet above the dark interior, having numerous irregularities, but no central peak. The southern region is somewhat hilly, with several small craters and a considerable ring-plain. North of Vandelinus are two similar objects, and on the west is another of considerable size, irregular in form, having an enclosed crater-plain in its northwest corner.

CROZIER 419, (B.)—A small ring-plain, whose interior has a central peak. One of the bright streaks running north and south on the mare, extends from this crater, north, to the east of Messier.

MCCLURE 420, (B.)—A small but deep ring-plain with central peak on its floor; to the west is a small crater, and some mountains from 2000 feet to 2500 feet high.

BELLOT 421, (B.)—A small ring-plain with a bright, moderately high wall, gradually sloping. To the southwest on the terminator are some mountain tops and the walls of Goclenius, Magelhæns, Colombo and Cook; to the latter belong the two ring-plains south of it.

BIOT 329, (M.)—A small but very bright ring-plain; east of it, and directly on the terminator, is another bright crater-plain, very deep; several smaller ones south, while northwest is a mountain arm extending from Wrottesley (422,) northeast into the mare.

HECATÆUS 351, (M.)—A long walled plain near the limb, measuring 115 miles in length; its interior has a bright crater, a central peak, and a number of ridges and small mountains; on the east is a smaller plain 46 miles in diameter, and still farther east a crater of considerable brightness.

WILLIAM HUMBOLDT 352 (M.)—A great walled plain, the third largest visible to us, possessing an area of nearly 12,000 square miles, with lofty peaks and walls, 16,000 feet high on the east, 10,200 feet on the north, and 11,500 feet on the west. Its floor contains some fine peaks

of from 2200 feet to 5700 feet in height, a number of ridges and two dark grey-steel-colored spots.

PETAVIUS 340, (R.)—Perhaps the finest walled plain on this plate; it has a convex interior and a peak in the centre about 5600 feet high. Some portions of its walls on the east are 11,000 feet, on the west only 6400 feet above the floor. From the central peak to the southeast wall extends a fine rill, very conspicuous and easily seen. When on the terminator, Petavius presents an interesting appearance, and its surroundings are full of ridges and hills, forming narrow valleys. At the south, where the walls meet, is a formation very similar to Petavius, but exceedingly small.

PALITSCH 341, (S.)—A very curious ring-plain resembling a gorge when on the terminator, with steep and narrow walls. West of it are two ring-plains, the walls of the one nearest Palitsch rising 6000 feet above the interior, whilst the other has a central peak and walls about 7700 feet high.

PHILLIPS 423, (B.)—A fine walled-plain with numerous ridges on its interior; it has very high walls and on the western slope are two deep craters.

WROTTESLEY 422, (B.)—A ring-plain east of Petavius, whose walls are 8837 feet high on the east, and as they retain their shadows nearly four days after sunrise (M.) they must be very steep. The interior contains a central peak south of which N. sometimes sees a small craterlet.

LEGENDRE 353, (M.)—A ring-plain 46 miles in diameter, with a broken wall, having two craters north and east, at which point they rise from 4500 feet to 8204 feet on the north, 11,500 feet on the west, 9000 feet above the interior, which according to M. is only crossed by a small ridge; under certain illuminations I have suspected a central elevation.

ADAMS 437, (B.)—The largest ring-plain south of Legendre, with a *very* high peak on its eastern wall which borders on an elevated plateau; west is a formation resembling Adams, but narrower. The northern interior is very much lower than the central and southern parts. East of Adams is a dark, precipitous crater with bright walls and interior on an elevated plateau.

HAZE 342, (S.)—A large ring-plain. The rugged wall rises about

7500 feet above its interior, on which are some low mountains, a crater near the northern extremity, and some crater-like depressions.

SNELLIUS 343, (R.)—A fine ring-plain, with broad walls rising on the east 6823 feet above the interior, which contains a central mountain. Northeast of it is a small ring-plain (whose deep interior is 6695 feet below the surface,) and several peaks, while southeast are two smaller craters apparently very deep.

STEVINUS 344, (R.)—A fine ring-plain south, and a little to the east of Snellius, which it resembles. It has an interior with a bright central peak. Its broad terraced walls contain some peaks which rise on the south 11,420 feet and on the north 10,180 feet above the floor. East, northeast and south, are some bright craters. According to N., Stevinius is better visible in Full than perhaps any other formation of its size in this region. (Singular that its companion Snellius should be found with so much difficulty in Full.)

REICHENBACH 375, (M.) O. T.—An irregular ring-plain with a level interior; its lofty walls rise on the northeast 11,721 feet, and are broken in different places by passes. South of Reichenbach is a considerable highland, and to the west are several small ring-plains and craters.

FURNERIUS 345, (R.)—A vast irregular walled-plain. The wall contains a number of ridges; a small but deep ring-plain and some crater-like depressions near the western, and one near the southern wall, which rises 10,033 feet on the east, and 11,490 feet on the north, above the floor; on the northern slope of the wall is a deep crater, east of which is a small, deep ring-plain, whilst on the west of Furnerius are a great number of ring-plains and craters. The color of the floor of Furnerius is dark, like that of Vendelinus.

MARINUS 379, (M.)—This ring-plain is scarcely perceptible, but appears in this crescent as a dark spot, except one day after New, when its narrow wall rises considerably above the interior, in some places 7700 feet high. North is a small steel-grey ring-plain, with a low wall. Several other craters of no distinction surround this plain. Marinus borders on the north of the Mare Australe.

OKEN 380, (M.)—A considerable ring-plain northeast of the Mare Australe, with bright, high walls, in places about 6000 feet above its bright interior, which presents an interesting view shortly after New during a strong westerly libration; directly south is a deep depression

and about five degrees farther south is a very high ridge northeast of a dark-grey spot.

FRAUNHOFER 377, (M.)—A moderately sized ring-plain with walls rising about 5500 feet above the interior, which is almost level; on the northeast this wall has a crater-like formation and on the west are similar objects, the southern one being deep; others of a like character south.

RHEITA 376, (R.) O. T.—A circular ring-plain, whose lofty and steep-terraced walls rise 14,350 feet on the north, and 10,033 feet on the east above the floor, which contains a central peak and a small crater. To the south and commencing at the eastern wall is an immense valley 187 miles in length and from 10 to 25 miles in breadth, and ending at the extreme southwest into a pear-shaped valley enclosed by two lofty mountain arms.

VEGA 378, (M.)—A curious formation resembling a human ear, of which N. says that it only appears as a ring-plain under certain conditions of libration and illumination, generally only the eastern wall appearing, the rest being more or less hidden. To the west and south are some conspicuous crater-plain-like formations of considerable depth. Objects in this vicinity seem to partake of the same nature as Vega, only partly enclosed.

MARE AUSTRALE Z, (M.)—A dark mare on the southwestern limb and clearly visible on Plate I.; its length is about 360 miles, and the portion south of Oken about 190 miles in breadth. It is broken in one place by a broad, bright land-stretch from west to east. The mare contains numerous low ridges and ring-plains of considerable dimensions.

STEINHEIL 385, (M.)—A deep, double ring-plain on the terminator of Plate I., the northeastern one is the larger of the two; it is 27¾ miles in diameter, with a depth of 11,772 feet beneath the western, and 11,887 beneath the eastern wall, with an almost perfectly level interior, whilst the floor of the companion is 11,079 feet beneath its eastern wall. North and northwest of Steinheil are a number of deep craters and peculiar formations, and in the west, from Vega to Biela is a row of fine ring-plains, in some places of considerable depth.

HANNO 382, (M.)—A ring-plain between Biela and the limb, close to the Mare Australe, whose walls and interior are very bright it is surrounded on the south by a deep, level ring-plain, west of

which is a fine mountain, and on the north, northeast and south are a number of considerable ring-plains with high, steep walls and bright level interiors.

PONTICOULANT 381, (M.)—A great ring-plain southwest of Biela, with irregular walls rising to 6000 feet above its level interior. Directly south is a similar formation, and east is a large ring-plain with a central peak; between this and Ponticoulant is a small, bright crater.

BIELA 392, (M.)—A fine ring-plain near the terminator, with high eastern and southwestern walls rising there to a height of about 9000 feet. It has a small central peak, a small ring-plain north, and another south, of considerable depth and an almost level interior.

HAGECIUS 391, (R.)—A peculiar formation on the terminator southeast of Biela with many crater-like depressions on its borders. Its floor has two ring-plains with central peaks, which are still in shadow on Plate I. South and west are a number of small but deep depressions.

BOUSSINGAULT 399, (M.) O. T.—An immense ring-plain 92 miles in diameter, divided into two parts by a curved wall, giving the whole an appearauce of an amphitheatre, with its proscenium on the south. Boussingault is surrounded by ring-plains of large dimensions, covering considerable area; south are two smaller ring-plains, east of which are some steep mountains; the eastern and southeastern vicinity seems to be very mountainous and of a wild character.

BOGUSLAWSKY 398, (M.)—The great walled-plain southeast of Boussingault on the terminator. Owing to the deep shadows which surround this formation, a description would be unavailable, and will therefore be reserved for the next plate.

LEIBNITZ MOUNTAINS 259, (S.)—During a strong northern libration this mountain range is visible on the southern limb. It is a series of ranges containing four high peaks, being between 25,000 feet and 30,000 feet high, which are undoubtedly the highest mountains visible on the surface. On Plate I., these mountains form part of the southern cusps of the moon.