

# PHOTOGRAPHIC LUNAR ATLAS

based on photographs taken at the  
**Mount Wilson, Lick, Pic du Midi,  
McDonald and Yerkes Observatories**

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## PHOTOGRAPHIC LUNAR ATLAS

### 1. Introduction and Summary

The purpose of this Atlas is to present the surface record of the moon as shown on the best photographs now available. The selected photographs were taken at five observatories, Mount Wilson, Lick, McDonald, Yerkes, and Pic du Midi. The best resolution obtained is about  $0''.4$  corresponding to about 0.5 miles or 0.8 kilometers. This matches the optical resolving power of an 11-inch visual telescope used under perfect conditions. This aperture may be compared with the 6-inch used by J. Schmidt in his great map published in 1878, a map that has not been exceeded in general usefulness, though limited areas have been better represented by observations with somewhat larger apertures. Not only do the best photographs show, on the whole, more than the visual maps; they show the lunar surface with precision, both as to location and intensity and, of course, with completeness up to the resolving power attained, none of which are practicable in visual drawings. The information is increased if several photographs of the same area taken under different illuminations are combined to bring out to maximum advantage both low-level detail and steep mountain slopes.

Several photographic lunar atlases were issued at the beginning of this century, the most important of which is that by Loewy and Puiseux of the Paris Observatory between 1896 and 1910. This contains photographic enlargements to a scale of 1.2 to 2.7 meters for the lunar diameter, with an average of

2.0 meters. It is not arranged systematically, as is the present Atlas. Because of its quality, the Paris Atlas is of lasting value.

**Scale, size, usage.** — With large apertures and the best conditions visual observations have a resolving power of about 0'1, about four times better than the best photographs. In order that such visual work may be efficiently organized, good charts are needed from which to work, for purposes of reference, etc. No better charts can be found than good photographs, enlarged to a scale that brings out to the unaided eye all that the originals contain. That scale is found to be about 100 inches or 2.5 meters to the lunar diameter (1mm = 1.37km or 0.85 miles; 1 inch = 21.6 miles; 1 mile = 1.2mm; scale 1:1,370,000). On that scale 0'4 equals 0.5mm, which can be seen without additional magnification. However, for objects of special interest, photographed under exquisite conditions, double the scale, or 200 inches (5 meters) to the lunar diameter, is to be preferred. In the present Atlas the 100-inch scale has been adopted. A Supplement will be issued later, on double the scale, giving high-quality photographs of selected objects.

On the 100-inch scale and with charts limited to a size manageable at the telescope (16 x 20 in. or 40 x 50 cm), 44 fields are needed to cover the visible lunar surface. If a minimum of four different illuminations are used for each field, the minimum number of Atlas sheets required is 176. In the present Atlas the average number of sheets per field is about five, resulting in some 220 sheets in all. It did not seem practicable to increase this number fourfold, as doubling the scale would have required, nor did it appear necessary because only a small fraction of the photographs have as high a resolving power as 0'4. Values between 0'6 and 1'0 are more common, and for these cases the adopted scale is generous.

The Atlas is so arranged that it can be used readily at the telescope. Not only have the sheet size and scale been so chosen but the type of reproduction and the paper were selected to permit the charts to be retouched at the telescope: the paper will take pencil, crayon, and ink. For this reason also, South is always up on the charts, as is customary in astronomical photography. It is recommended that observers use at least two copies, one for reference and the other(s) as research material at the telescope. The cost of the Atlas has been held to a minimum, roughly 10 cents a sheet, not much more than drawing paper.

**Organization.** — The Atlas is divided into three parts: (a) An Introduction of 11 sheets, showing the subdivision of the lunar surface into the 44 fields and giving the names of the maria, mountain ranges, and craters based on the system of Blagg and Müller, adopted by the International Astronomical Union in 1935. The field designations are by grid numbers (A to F, 1 to 8) as well as by names. The latter were derived from well-known or prominent, named features (craters, mountain chains, or maria), analogous with common usage in terrestrial maps. (b) The main body of the Atlas, composed of 4 sheets per field, or 176 sheets, to which are added two additional sheets for each of the four polar areas, C1, D1, C8, and D8, making 184 sheets in the body of the Atlas. (c) Supplementary sheets, 35 in number, giving additional coverage of the 44 fields, as available. The total number of sheets is therefore 230.

The 11 introductory sheets are loose-leaf and numbered, so that they can be used with the main body of the Atlas but returned for filing. The 176 sheets of the main Atlas are printed in sets of four

and folded. The four charts of each field are numbered *a*, *b*, *c*, and *d*. An effort has been made to present in *a* and *b* one morning and one evening view under moderately high sun, which shows most details reasonably well but avoids the terminator across the field; the *c* view is either a full moon or a view with high sun; the *d* field is supplementary to the *a* and *b* fields, and often shows one or two views with low-oblique illumination. The Supplement sheets are numbered *e*, *f*, etc. Occasionally two views were deliberately chosen to be similar from two high-quality originals, either from the same observatory (*C4e*, *C6f*, *D6 a* and *b*, *D7 a* and *b*, *D8 a* and *b*), or from different observatories (*D1 a* and *b*, *D2 a* and *e*, *D3 a* and *b*, *D4 a* and *b*). This will allow the user to check on the reality of fine detail.

The 35 supplementary sheets are numbered S-1 to S-35 and issued singly, so that they may be used with the other sheets of the same field, and filed in order afterward. For limb areas photographs with favorable librations were, of course, preferred. The margins of the sheets correspond only approximately to those shown on the introductory sheets, as the final choice for each sheet was a compromise between these intended boundaries and the special contents of each plate. Sometimes the choice was affected by extreme libration.

The history of the Lunar Atlas Project is briefly described in the next section. The final selection of the Atlas prints was made late in 1959 independently by Messrs. Whitaker and Kuiper from some 1200 prints. The selection was based on two criteria: quality and phase. Material of high quality, not duplicated by anything better, was included regardless of phase and libration; while photography of indifferent quality was used only to meet the demands of the intended broad coverage of phases. It proved possible, without adding an undue number of supplementary sheets, to include in this Atlas essentially all material that contained significant independent information, although there were marginal cases where something of interest could have been added. The most notable exceptions to the completeness are some high-quality photographs of local regions (smaller than the fields used here), obtained at the Pic du Midi, which were not included. They will be used in Supplément No. 3, mentioned below. Also, it was not possible, with very few exceptions, to use the Yerkes and McDonald material obtained after July, 1959.

The foregoing remarks should not impart to the present Atlas a degree of finality. For instance, by continued efforts, useful low obliques may be added which will show lava domes, ridges, and other gentle detail that the present Atlas does not record. Also, better full-moon photographs are needed for many fields.

**Future Supplements.** — Five supplements to this Atlas are planned or are in preparation: No. 1, giving the standard rectangular orthographic map grid, with coordinate lines shown at intervals of 0.01 radius, which will permit interpolation to 0.001 radius. This will enable the user to designate any lunar feature with sufficient precision for purposes of identification; No. 2, giving "rectified" photographs of the limb areas, i.e. photographs with the foreshortening removed by projection of selected photographs on a large white sphere and photography of the sphere normal to its surface; No. 3, giving photographs of high quality of selected surface markings, on double the scale of this Atlas; No. 4, giving additional material and replacing lesser-quality sheets in this Atlas; No. 5, giving a more detailed nomenclature, based on interpretative visual studies now being carried out at the McDonald and Yerkes Observatories.

## 2. History of the Lunar Atlas Project

The initial intention was to prepare a lunar atlas from photographs to be taken with the 82-inch telescope of the McDonald Observatory. Inspection early in 1955 of the series of some 500 plates taken between 1919 and 1927 by the late Dr. F. Pease at the Cassegrain focus of the 100-inch Mount Wilson telescope showed that duplicating the best work already done was likely to take many years and might not even fully succeed. It was clearly preferable to base the Atlas on the existing plate collections at Mount Wilson, Lick, and Pic du Midi Observatories, supplemented by new series at the McDonald and Yerkes Observatories.

This proposal was discussed at the Dublin meetings of the International Astronomical Union in August, 1955 (Trans. I.A.U. 9, 263, 1955) on the basis of a circulated memorandum, *Considerations on a New Photographic Lunar Map*. The relevant parts of this memorandum are quoted here:

A photographic map based on the best plates for each region would have more resolution, be much more complete and be clearer than any existing lunar map. It would plainly show when and where visual observation would become profitable; and it would guide and make more effective future visual work under the best conditions. . . The use of half-tones rather than photographic paper would enable the visual observer to make pencil marks on the charts. The nomenclature to be adopted requires early consideration. A system of labeling similar to that of the World Aeronautical Chart (which has about the same scale, 1:1,000,000) or the Civil Aeronautics Charts seems indicated. For instance, the C.A.A. map from  $+40^{\circ}$  to  $42^{\circ}$  and  $78^{\circ}$  to  $84^{\circ}$  W is called 'U-8 Cleveland'. One of the lunar charts would similarly be 'G-1 Plato' (D-2 in this Atlas). One can then find the chart either by remembering the main feature that gave it its name; or by the grid designation.

The problems of nomenclature were discussed at the same I.A.U. Meeting, on the basis of a memorandum *Statement on Lunar Nomenclature* from which the main points are quoted here.

From its inception, the I.A.U. has been responsible for assignments of lunar nomenclature. It inherited this function from an earlier international committee (Trans. I.A.U. 1, 52, 1922; 3, 111, 1928). It set up a special commission to deal with this problem (Comm. 17, Lunar Nomenclature), which completed its main task in 1935 by the publication of *Named Lunar Formations* in 2 volumes (catalogue and maps) by M. A. Blagg and K. Müller.

In 1938 Commission 17 was reorganized and the physical studies of the surface of the moon assigned to Commission 16; and with it lunar nomenclature. This decision was reiterated in 1948 (Trans. I.A.U. 7, 160, 1950) and since then the I.A.U. has made certain decisions on recent proposals for *new* names (Trans. I.A.U. 7, 63, 166, 169, 1950; 8, 216, 1952). . . . The repeated suggestions for adding names of contemporary scientists to the already long list of crater names adopted by the I.A.U. in 1935, points to one of the several weaknesses of the present system. The current "historical" system of nomenclature has acquired some value because many careful observations have been described in its terms. No such merit attaches to new names.

The I.A.U. thereupon endorsed a resolution adopted by Commission 16 (Planets and Satellites): "The Commission recommends to the Union that at the present time—and particularly pending the completion of the proposed photographic map of the Moon—no official recognition shall be given to additional lunar nomenclature" (Trans. I.A.U. 9, 263, 1955).

The 1935 I.A.U. system is adopted here with some minor changes in spelling and other corrections listed in Table III. In this system about 680 lunar features have names and some 8,000 additional features have letters and symbols assigned, which are regionally attached to named features; thus Kepler A is a small crater near Kepler. The assignment of the 8,000 symbols has not been systematic and

should in time be revised. These symbols are omitted from the Atlas. The named features themselves are retained as listed in Table IV, to provide continuity with the past lunar literature. The I.A.U. will probably in the near future wish to re-examine the entire problem of lunar nomenclature in the face of modern requirements. A Supplement to this Atlas will then be issued showing the revised system for each of the 44 fields.

### 3. The Photographs

The photographs used were selected in two stages. First, all good (and some lesser-quality) photographs of the Mount Wilson, Lick, McDonald, Yerkes, and Pic du Midi collections were copied on 14 x 17 in. photographic paper, to a uniform scale of 80 inches (about 2 meters) to the lunar diameter (held within 1 or 2 per cent). The final selection was made from the roughly 1,200 prints so accumulated (the persons making the selection were unaware of the origin of each print, since this information was recorded on the back). While this led to some duplication, it ensured that all good photographs would be available in one file and that the selection could be made on the basis of the quality of the final prints. Supplements to the Atlas could be issued if additional phases had to be covered.

The production of the Atlas prints has proceeded as follows. During a stay as guest investigator at the Mount Wilson Observatory early in 1955, Mr. Kuiper had the opportunity to examine the various Mount Wilson lunar series, which total well over 1,000 plates. The courtesies extended by Drs. Bowen and Humason and the assistance offered by Miss Helen Wright in examining the records taken by her late father are gratefully acknowledged. It was decided to limit the study to the series taken by the late Dr. F. Pease at the Cassegrain focus of the 100-inch reflector. The plates are 8 x 10 in. mostly "Eastman 33" emulsion, and the focal length is about 135 feet (41 meters); some of these plates are exquisite. The quarter phases are particularly well covered, but full moons are absent because around that phase the telescope was normally used for spectroscopy. The Lick Observatory series supplement the Pease collection very well, having both full-moon and crescent coverage. The best 70 plates of the Pease collection were selected and catalogued, and diapositive copies were secured in 1956 through the courtesy of Dr. Bowen and the co-operation of Mr. Miller and Mr. S. Bowen. From these positives a small-scale model atlas (negatives on paper) was produced at the Yerkes Observatory which was later used as a guide for the Mount Wilson part of the present Atlas. In addition, Dr. Shane kindly made available a fine series of 35 contact positives on film of the best Lick originals, mostly taken by Dr. J. H. Moore and Mr. F. Chappell, which served for the planning of the final copying of the Lick series.

Agreement was reached with Drs. Bowen and Shane on the general plan of this Atlas in November 1956. Mr. Kuiper was appointed Morrison Research Associate in 1957 and stayed two months, May and June, at the Lick Observatory. During this period he was able to complete the copying of the selected Mount Wilson originals and make a good beginning with the copying of the Lick plates. Dr. Shane made darkroom space available and Mr. R. Watson assisted admirably in setting up the necessary technical facilities. It was not possible to complete copying the Lick series during the two-months stay, and Mr. Watson agreed to do the remainder later in 1957 and early 1958. Mr. Kuiper obtained, during this stay, about 600 prints (14 x 17 in.), including duplicates and a number of selected fields copied on double the scale, intended for Supplement No. 3 (see above). The McDonald series was

started on February 23, 1956, and it was continued during one or two observing runs each year; since early 1959 the work has been in collaboration with Messrs. Whitaker and Arthur; over 400 photographs had been taken by late 1959. The Yerkes series was started November 20, 1958, and is conducted by Mr. E. Moore; by late 1959 over 600 photographs had been taken. The Yerkes series is calibrated with star trails and will serve also for selenodetic purposes.

The Pic du Midi plates were taken by the late Dr. Lyot, mostly in the years 1943-44. Contact positives were made in Paris in 1958 under Dr. Dollfus' supervision, and the selection was made by Mr. Kuiper on the basis of these. The originals were then secured through the kind co-operation of Drs. Danjon and Dollfus, and copied at the Yerkes Observatory during the spring of 1959. The extensive copying work of the McDonald, Yerkes, and Pic du Midi plates was carried out by Mr. Whitaker; Mr. Tapscott also took part in this work and assisted particularly in getting the entire Atlas collection in final form for publication.

Nearly all paper prints were *shaded* to take out strong gradients toward the terminator, etc. and to permit the use of contrasty paper in spite of strong gradients over the plate. The prints are, therefore, not photometrically accurate, though local relative contrasts will be correct. This process, regarded essential for the retention of detail on paper prints, usually required one or more trial exposures per print and probably doubled the work load. It is believed, however, that little shown by the original plates was lost in the copying. In addition, a printing process for this Atlas was selected which appeared to retain essentially all that was on the photographs.

Finally, the photographs were *retouched* for defects, except when these were fine lines caused by scratches on the negative, in which case they were usually left for technical reasons. Many of the older negatives, particularly some of the very best, appeared to have been handled many times. These were very carefully rubbed with vaseline before copying, and this made most of the fine scratches invisible on the prints, and narrowed the width of the heavy scratches. Other obvious defects (mostly small round specks, white or dark) were touched out, because they would be confusing to many users, particularly at the telescope with dim light. Their number averaged perhaps 50 per print but varied greatly from print to print. The average time required for retouching was about 45 minutes per print. Most of the retouching was done at the Yerkes Observatory by Mr. F. E. Manning of Chicago, an expert craftsman, and Mr. Tapscott; but part of the Mount Wilson prints had been retouched in 1957 by Mr. R. Watson at the Lick Observatory. Often a print from another original but similar phase was used as a guide. All retouched sheets were checked upon completion by Mr. Kuiper, usually with the aid of a comparison sheet. He made a number of these checks stereoscopically; these are marked in Table I with an asterisk following the plate number. Since stereoscopic checks will reveal all major flaws, the plates so checked are regarded as essentially free from appreciable defects. The best photographs were given preference in the stereoscopic checks because of their greater value and because their sharpness makes the recognition of defects more difficult. A feature on L 11, north of Pytheas, showed remarkable similarity to a crater, but it was found absent on plates taken before and after. Most of the prints and proofs were checked independently by Mr. Whitaker. Not all of the retouching has been satisfactory; some retouched spots became yellowish with time and show as sharply bounded darkish spots on the Atlas prints. Some instances were found where a small real crater had been touched out and a few similar errors may have escaped detection. Inevitably, some new defects have entered in the



final printing process; these will be readily recognized by their appearance.

The particulars of the photographs used are collected in Tables I and II. The *plate numbers* given are those shown on the originals except for the Lick plates, which have only observing times; arbitrary numbers were assigned to these for the convenience of identification. The *times* given on the originals were used to compute the colongitude and the geocentric librations. The colongitudes were checked by Mr. Moore against the lunar image itself. Mr. Arthur has checked the *scale* of the final prints on some proof sheets. The combined effects of scale errors in the initial copying, the press copying, and differential shrinkage of the various papers involved, appears to have led to scale errors that are usually only 1 or 2 per cent but occasionally somewhat larger. The average scale is that quoted on p. 4; it applies to unforeshortened distances (parallel to the limb).

The I.A.U. *nomenclature* was carefully examined by Messrs. Whitaker and Arthur and a number of spelling errors and inconsistencies were discovered, which are listed in Table III. Mr. Whitaker was able to draw here on his unpublished studies of the history of lunar nomenclature. The adopted names are found in Tables IV and V, which also list the Atlas field for each named feature. It is intended to provide in Supplement No. 5 (see above) a more detailed system of nomenclature and a co-ordinate grid for general reference purposes in Supplement No. 1.

The overlays used in the Introduction were prepared by Mr. Arthur.

The statistics of the photographs are as follows: The main body of the Atlas has 184 sheets containing 212 photographs; the Introduction contains 11 sheets with 5 photographs, the Supplements 35 sheets with 63 photographs. The totals are therefore 230 sheets and 281 photographs. Of these, 94 are from Mount Wilson; 63, Lick; 52, McDonald; 41, Yerkes; and 31, Pic du Midi. Inspection will show that each of these five contributions has been important.

A description of the lunar surface, based on this Atlas and related material, will be published elsewhere.

**Acknowledgments.** — The Editor wishes to thank Drs. Bowen, Shane, and Danjon for agreeing to the joint publication of the best lunar plates of their observatory series. Financial support for this project, enabling us to make the necessary preparations for this Atlas, was received, first from the National Science Foundation (Grant G-2741), and later from the Cambridge Research Directorate of the Air Force (Contract No. AF 19(604)-3873). Thanks are due also to the printers, D. F. Keller Co. of Chicago for their interest and expert craftsmanship.

Yerkes Observatory  
December, 1959

Gerard P. Kuiper

**TABLE I — PLATES USED FOR CHARTS**

<i>Chart</i>	<i>Plate</i>	<i>Chart</i>	<i>Plate</i>	<i>Chart</i>	<i>Plate</i>	<i>Chart</i>	<i>Plate</i>
1, 2, 3	L 18	b	L 7	d	P 33c*	E3	a M 191*
4, 5	L 17a	c	L 18*	e	L 7, L 2	b	M 3*
6, 7	L 19	d	L 17b, W 97	f	W 113*	c	W 121
8, 9	L 11	B6	a L 7			d	Y 163, M 202
10, 11	L 10	b	P 20c*	D1	a W 121*	E4	a M 191*
		c	L 18	b	L 11*, M 10*	b	L 21
A2	a P 3c	d	M 127*, Y 41R*	c	M 28*	c	W 124*
b	W 341, M 30	B7	a L 7	d	W 189*	d	Y 163, M 202
c	L 19	b	Y 369*	e	M 284, W 226*	E5	a M 191*
d	Y 67	c	L 18	f	M 183*, M 3*	b	L 21*
A3	a Y 67*	d	P 20c*, W 97*	D2	a W 121*	c	W 124*
b	L 17a*	B8	a L 7	b	W 471	d	Y 163*, M 202,
c	L 19	b	L 3*	c	L 21*		M 335
d	L 4, P 3c	c	L 18*	d	M 284	E6	a M 191*
A4	a L 17a	d	L 2*	D3	a W 121*	b	P 15a
b	M 32, P 1c			b	L 11*	c	W 123*
c	L 19	C1	a W 216	c	Y 160	d	Y 163, M 207
d	Y 67	b	Y 37	d	W 195	E7	a W 222*
A5	a L 17a	c	M 28	D4	a W 124*	b	Y 237
b	Y 369	d	W 90	b	L 11*	c	W 123*
c	L 2	e	P 6b*	c	Y 160	d	W 464*, P 15a
d	P 1c, M 126	f	W 440*	d	P 35a, W 252	E8	a W 171
A6	a L 17a*	C2	a W 90	D5	a W 124*	b	Y 237
b	Y 369	b	W 216	b	W 192*	c	M 121*, M 90
c	L 2	c	L 6	c	Y 160	d	L 1, W 230
d	L 7*	d	W 106	d	M 285, P 38b	F2	a W 231
A7	a L 7	C3	a P 35a*	D6	a W 123*	b	M 373*
b	Y 369	b	W 108*	b	W 122*	c	M 184*, W 252*
c	L 3	c	L 5*	c	Y 160	d	Y 106*
d	M 110, L 2	d	W 111*, W 115*	d	W 192*	F3	a Y 110*
		C4	a P 35a	D7	a W 123*	b	W 231
B1	a Y 65	b	W 111*	b	W 119*	c	W 173
b	L 17b*	c	L 5	c	L 18	d	M 373*
c	M 30, W 341	d	Y 42R*, M 564*	d	Y 160	F4	a Y 108*
d	P 3c	C5	a P 35a	D8	a W 123*	b	W 172*
B2	a Y 65	b	W 113*	b	W 454*	c	W 124
b	Y 37	c	L 5*	c	L 18	d	P 14a, M 374*
c	L 18	d	W 97*	d	L 13	F5	a Y 108*
d	W 80	C6	a P 9a*	e	P 38b	b	W 172*
B3	a W 80	b	W 113*	f	W 464	c	W 124
b	L 19	c	W 97*			d	P 14a, M 372*
c	L 18	d	P 34b*	E1	a W 226*	F6	a W 172*
d	Y 65	C7	a P 34b*	b	P 14a	b	Y 110
B4	a L 7	b	W 97*	c	M 384	c	M 121*
b	W 80*	c	L 5*	d	W 231	d	W 230
c	L 18*	d	W 113*	E2	a W 173	F7	a Y 110
d	M 127*, W 90*	C8	a L 26*	b	P 14a	b	W 172
B5	a L 19*	b	W 97*	c	W 121	c	M 121*
		c	M 111*	d	W 226	d	W 230

<i>Chart</i>	<i>Field</i>	<i>Plate</i>	<i>Chart</i>	<i>Field</i>	<i>Plate</i>	<i>Chart</i>	<i>Field</i>	<i>Plate</i>
S1	A6 e	M 87, L 5	S13	C6 f	W 119*, W 123*	S24	D7 e	W 192*
S2	A6 f	L 29*, M 479*	S14	C6 g	Y 41R*	S25	D7 g	P 34b*, M 189
S3	B3 e	Y 72, W 90	S15	C7 e	W 119*	S26	D8 g	M 108, M 104,
S4	B4 e	Y 65, Y 72		C8 g	W 123*			M 122, P 15a,
S5	B5 e	W 80*	S16	D1 g	W 185*, W 252*			L 16
S6	B5 f	L 28*	S17	D2 e	L 11*	S27	E2 e	Y 163, M 184
	B6 e	W 97*	S18	D3 f	M 413	S28	E6 e	Y 44R
S7	B7 e	Y 65		D2 f	W 252		F7 f	Y 237
S8	B7 f	L 5	S19	D3 e	W 252, M 284*	S29	E6 f	W 124*
S9	C2 e	P 6b	S20	D4 e	W 195*	S30	E8 e	W 464*
S10	C3 e	M 564, M 582	S21	D5 e	P 35a	S31	F3 f	W 121
S11	C4 e	W 115*, W 124*, L 11*		D4 f	P 37b	S32	F3 e	P 14a
			S22	D6 e	P 34b, W 464*		F5 e	Y 237
S12	C5 e	W 124*	S23	D7 f	W 464*	S33	F6 e	W 123, M 380
	C6 e	W 122*		D6 f	M 285	S34	F6 f	Y 237
						S35	F7 e	M 372, L 2, M 74

Notes. Where more than one plate is given, the order is from left to right or top to bottom. Original plates checked stereoscopically for defects are denoted with \*.

**TABLE IIA**  
**LICK OBSERVATORY PLATES**

Lick ( $\lambda = + 8^{\text{h}} 06^{\text{m}} 35^{\text{s}}$ ,  $\beta = 37^{\circ} 20' 25''$ , Alt. 1283 m.)

Plate	Date	U.T.	C	<i>l</i>	<i>b</i>
L1	Aug. 18, 1937	5:03	48.3	-3.3	-3.0
L2	July 31, 1939	8:34	89.3	+1.6	-6.5
L3	Aug. 13, 1940	4:16	27.9	+5.9	-6.3
L4	Mar. 8, 1936	8:10	90.0	+1.3	+6.1
L5	Oct. 22, 1937	8:03	122.5	+1.0	-0.6
L6	Dec. 8, 1938	6:56	103.7	-1.9	+4.3
L7	Aug. 9, 1940	4:01	338.9	+3.7	-1.8
L10	Aug. 20, 1938	12:47	206.1	-4.3	+2.9
L11	Oct. 26, 1937	13:41	174.0	+5.8	+5.6
L13	July 24, 1942	4:38	42.9	-3.3	-6.6
L16	July 23, 1942	4:36	30.7	-4.7	-6.6
L17a	June 3, 1938	4:02	328.7	+5.2	+6.6
L17b	June 3, 1938	4:00	328.7	+5.2	+6.6
L18	Jan. 17, 1946	7:51	82.2	+4.0	-2.7
L19	May 7, 1938	4:14	359.0	+4.8	+6.7
L21	Jan. 12, 1938	3:55	38.2	-4.7	-1.2
L26	Aug. 13, 1940	4:14	27.9	+5.9	-6.3
L28	Oct. 24, 1937	13:01	149.4	+4.1	+3.1
L29	Sept. 17, 1959	6:33	87.8	+5.0	-0.9

**TABLE IIB**  
**McDONALD OBSERVATORY PLATES**

McDonald ( $\lambda = 6^{\text{h}} 56^{\text{m}} 06^{\text{s}}$ ,  $\beta = +30^{\circ} 40' 17''$ , Alt. 2081 m.)

Plate	Date	U.T.	C	<i>l</i>	<i>b</i>
M3	Feb. 23, 1956	5:34	51.8	-0.7	+4.3
M10	Feb. 24, 1956	3:06	62.7	+0.8	+5.3
M28	Feb. 26, 1956	5:19	88.1	+3.9	+6.5
M30	Feb. 26, 1956	5:26	88.2	+3.9	+6.5
M32	Feb. 26, 1956	5:30	88.2	+3.9	+6.5
M74	Aug. 21, 1956	5:33	88.9	-2.2	-6.5
M87	Aug. 22, 1956	7:07	101.9	-3.3	-6.5
M90	Aug. 22, 1956	7:13	101.9	-3.3	-6.5
M104	Aug. 22, 1956	7:35	102.1	-3.3	-6.5
M108	Aug. 23, 1956	10:10	115.6	-4.3	-6.2
M110	Aug. 23, 1956	10:13	115.6	-4.3	-6.2
M111	Aug. 23, 1956	10:14	115.6	-4.3	-6.2
M121	Aug. 24, 1956	9:50	127.6	-5.0	-5.7
M122	Aug. 24, 1956	9:54	127.7	-5.0	-5.7

**TABLE IID — Continued**

Plate	Date	U.T.	C	<i>l</i>	<i>b</i>
M126	Aug. 24, 1956	10:04	127.8	-5.0	-5.7
M127	Aug. 24, 1956	10:05	127.8	-5.0	-5.7
M183	Aug. 30, 1956	11:43	201.8	-5.0	+2.3
M184	Aug. 30, 1956	11:44	201.8	-5.0	+2.3
M189	Aug. 30, 1956	11:49	201.9	-5.0	+2.3
M191	Aug. 30, 1956	11:51	201.9	-5.0	+2.3
M202	Aug. 31, 1956	11:52	214.1	-3.9	+3.7
M207	Aug. 31, 1956	11:59	214.2	-3.9	+3.7
M284	Sept. 14, 1956	2:54	20.7	+2.6	-4.5
M285	Sept. 14, 1956	2:55	20.7	+2.6	-4.5
M335	Sept. 16, 1956	5:15	46.2	-0.2	-6.1
M372	Mar. 24, 1959	5:03	85.7	-4.1	+2.2
M373	Mar. 24, 1959	5:05	85.7	-4.1	+2.2
M374	Mar. 24, 1959	5:07	85.7	-4.1	+2.2
M380	Mar. 24, 1959	5:43	86.0	-4.1	+2.2
M384	Mar. 24, 1959	5:50	86.1	-4.1	+2.2
M413	Oct. 10, 1959	1:59	6.1	+5.6	-6.2
M479	Oct. 17, 1959	6:53	93.7	+3.1	+3.0
M547	Oct. 21, 1959	8:54	143.4	-1.9	+6.6
M564	Oct. 22, 1959	11:16	156.8	-3.3	+6.8
M582	Oct. 23, 1959	8:57	167.8	-4.4	+6.7

**TABLE IIC**  
**PIC DU MIDI OBSERVATORY PLATES**

Pic du Midi ( $\lambda = -0^{\text{h}} 00^{\text{m}} 34^{\text{s}}$ ,  $\beta = + 42^{\circ} 56' 12''$ ,  
Alt. 2862 m.)

Plate	Date	U.T.	C	<i>l</i>	<i>b</i>
P1c	Dec. 29, 1943	18:35	305.3	+0.7	+0.7
P3c	Dec. 30, 1943	17:45	317.1	+2.1	+2.3
P6b	Jan. 2, 1944	19:20	354.4	+5.3	+6.0
P9a	Jan. 3, 1944	17:40	5.7	+5.8	+6.6
P14a	Jan. 7, 1944	23:30	57.2	+5.3	+5.1
P15a	Jan. 7, 1944	23:20	57.1	+5.3	+5.1
P20c	Jan. 14, 1944	5:30	133.0	-1.8	-3.2
P33c	May 30, 1944	20:40	10.4	-1.0	-5.1
P34b	May 30, 1944	20:45	10.5	-1.0	-5.1
P35a	May 30, 1944	20:50	10.5	-1.0	-5.1
P37b	May 31, 1944	21:10	22.9	-2.3	-5.9
P38b	May 31, 1944	21:10	22.9	-2.3	-5.9

**TABLE IID**  
**MOUNT WILSON OBSERVATORY PLATES**

Mount Wilson ( $\lambda = +7^{\text{h}} 52^{\text{m}} 14^{\text{s}}$ ,  $\beta = +34^{\circ} 12' 55''$ ,  
Altitude 1742 m.)

<i>Plate</i>	<i>Date</i>	<i>U.T.</i>	<i>C</i>	<i>l</i>	<i>b</i>
W80	Sept. 12, 1919	11:20	134.5	-0.1	-2.6
W90	Sept. 13, 1919	11:24	146.8	+1.1	-1.0
W97	Sept. 13, 1919	12:55	147.5	+1.2	-0.9
W106	Sept. 14, 1919	11:41	159.1	+2.2	+0.7
W108	Sept. 14, 1919	12:01	159.3	+2.2	+0.7
W111	Sept. 14, 1919	12:58	159.7	+2.3	+0.8
W113	Sept. 14, 1919	13:11	159.8	+2.3	+0.8
W115	Sept. 15, 1919	11:55	171.4	+3.2	+2.3
W119	Sept. 15, 1919	13:00	172.0	+3.2	+2.3
W121	Sept. 15, 1919	13:23	172.1	+3.2	+2.4
W122	Sept. 15, 1919	13:30	172.2	+3.2	+2.4
W123	Sept. 15, 1919	13:38	172.3	+3.2	+2.4
W124	Sept. 15, 1919	13:44	172.3	+3.2	+2.4
W171	July 9, 1920	11:38	202.6	-6.5	-1.1
W172	July 9, 1920	11:44	202.6	-6.5	-1.1
W173	July 9, 1920	12:10	202.8	-6.5	-1.0
W185	Oct. 4, 1920	11:24	184.7	+0.9	+6.3
W189	Oct. 4, 1920	11:53	184.9	+0.9	+6.3
W192	Oct. 4, 1920	12:20	185.2	+1.0	+6.3
W195	Oct. 4, 1920	12:29	185.2	+1.0	+6.3
W216	April 15, 1921	4:20	10.4	-0.2	+6.7
W222	July 28, 1921	12:20	204.7	-7.6	+3.4
W226	July 29, 1921	12:25	217.0	-7.1	+4.6
W230	July 30, 1921	12:22	229.1	-6.1	+5.6
W231	July 30, 1921	12:24	229.1	-6.1	+5.6

**TABLE IID — Continued**

<i>Plate</i>	<i>Date</i>	<i>U.T.</i>	<i>C</i>	<i>l</i>	<i>b</i>
W252	Sept. 24, 1921	(11)	192	-4.9	+6.6
W341	Oct. 3, 1925	7:00	98.5	+5.4	+6.5
W440	Sept. 5, 1928	12:09	160.5	+0.5	+1.2
W454	Sept. 6, 1928	12:42	172.9	+1.5	-0.5
W464	Sept. 7, 1928	12:41	185.1	+2.4	-2.1
W471	Sept. 7, 1928	12:49	185.2	+2.4	-2.1

**TABLE IIE**  
**YERKES OBSERVATORY PLATES**

(R = Ritchey)

Yerkes ( $\lambda = +5^{\text{h}} 54^{\text{m}} 13^{\text{s}}$ ,  $\beta = 42^{\circ} 34' 13''$ , Alt. 334 m.)

<i>Plate</i>	<i>Date</i>	<i>U.T.</i>	<i>C</i>	<i>l</i>	<i>b</i>
Y37	Feb. 25, 1959	7:24	118.0	-2.2	+1.4
Y41R	Sept. 3, 1901	20:20	148.9	+2.2	+0.2
Y42R	Sept. 3, 1901	20:25	148.9	+2.2	+0.2
Y44R	Nov. 21, 1901	1:15	28.6	-6.9	-5.5
Y65	April 14, 1959	0:43	339.6	-5.4	+6.6
Y67	April 14, 1959	1:04	339.8	-5.4	+6.6
Y72	April 14, 1959	1:29	340.0	-5.4	+6.6
Y106	April 22, 1959	3:57	78.7	-3.5	-0.4
Y108	April 22, 1959	4:00	78.8	-3.5	-0.4
Y110	April 22, 1959	4:10	78.8	-3.5	-0.4
Y160	May 18, 1959	1:42	35.1	-6.8	+2.0
Y163	May 18, 1959	1:44	35.1	-6.8	+2.0
Y237	June 19, 1959	6:34	68.4	-0.5	-5.4
Y369	July 22, 1959	9:23	113.1	+6.2	-4.0

**TABLE III**  
**AMENDMENTS TO I.A.U. NOMENCLATURE**

a) Amendments to spelling and typography

<i>Adopted name</i>	<i>I.A.U. name</i>	<i>Reason for Change</i>
Aestatis	AEstatis	see Note 1
Aestuum	AEstuum	see Note 1
Anděl	Andel	Accent omitted
Angström	Angstrom	Accent omitted
Archerusia	Acherusia	Error by Mädler
Auzout	Azout	Error by Schröter
Bond, G.	Bond (G. P.)	Second initial superfluous; ( ) used for formation type
Bond, W.	Bond (W. C.)	ditto
Cabeus	Cabaeus	Error by Blagg
Cassini, J.	Cassini (J. J.)	see {Bond}
Dembowski	Dembowsky	Error by Krieger
Fecunditatis	Focunditatis	Error by Cassini
Feuillée	Feuillé	Error by Schmidt
Fracastorius	Fracastor	German spelling retained by Blagg
Gerard	Gérard	Error by Mädler
Grove	Groves	Error by Neison
Gyldén	Gylden	Accent omitted
Herschel, C.	Herschel (Car.)	see {Bond}
Herschel, J.	Herschel (J.)	see {Bond}
Hooke	Hook	Error by Mädler
Humboldt	Humboldt (W.)	see {Bond}
Lansberg	Landsberg	Error by Mayer
Lemonnier	Le Monnier	to be consistent with other French names
Maestlin	Moestlin	to prevent further confusion with "Mösting"
Mayer, C.	Mayer (Chr.)	see {Bond}
Mayer, T.	Mayer (T.)	see {Bond}
McClure	MacClure	Error by Neison
Oenopides	OEnopides	see Note 1
Oersted	OErsted	see Note 1
Pickering, E.	Pickering (E.)	see {Bond}
Pickering, W.	Pickering (W. H.)	see {Bond}
Ptolemaeus	Ptolemäus	German spelling retained by Blagg
Régnault	Regnault	Accent omitted
Sinas	Sina	Error by Schmidt
Somni	Somnii	Error by Cassini

<i>Adopted name</i>	<i>I.A.U. name</i>	<i>Reason for change</i>
Struve, O.	Struve (Otto)	see [Bond]
Tacquet	Taquet	Error by Schröter
Taenarium	AEnarium	Error by Mayer
Vendelinus	Vendilinus (map)	Error by Blagg
Wilhelm	Wilhelm I	see [Bond]
Wolf	Wolf (Max)	see [Bond]
Wolff (Mt.)	Wolf (Mt.)	Error by Mädler
Zucchius	Zuchius	Error by Schröter
Rille	Cleft	"Cleft" implies cleavage; "Rille" has no such implication (see Oxford and Webster's Dictionaries)
Altai Scarp	Altai Mts.	This feature is a scarp, not a mountain range.

The following errors by Mädler have not been corrected, since to do so would introduce confusion:—

<u><i>Mädler et seq.</i></u>	<u><i>Original name (Riccioli)</i></u>
Almanon	Almaeon
Tacitus	Tatius

No change has been made to names originally mis-spelled by Riccioli and Hevelius.

*Note 1.* All diphthongs have been split into separate letters for convenience when typing; in German names however, the shortened form with "umlaut" has been used almost exclusively.

<u>b) Deletions</u>	<u><i>Note</i></u>
Oriani	A
Timoleon	A
Riphaeus Boreus	B
Riphaeus Major	B
Riphaeus Medius	B
Riphaeus Minor	B
Rook Mountains	C
Ural	B
Gay-Lussac (Sinus)	B
Pietrosul Bay	B
Nebularum (Palus)	D
Hiemis (Mare)	E
Parvum (Mare)	E

#### *Explanation of Notes*

- A. Scarcely identifiable; not true formations
- B. Features not worthy of separate names
- C. Limb mountains not readily identifiable
- D. Ill-defined area not worthy of a separate name
- E. Small patches of dark material not worthy of separate names

c) Addition

Deslandres                      This is the only new name that has been officially recognized by the I.A.U. and added to the 1935 list. See Trans. I.A.U. 7, 1950, 63.

d) Substitution

Henry (Frères) replaced by Henry, Paul and                      This change was made to distinguish one formation from the other.  
Henry, Prosper

e) Changes of Boundary

Brown                      Now applies only to the northern component of the I.A.U. Brown  
Debes                      Now applies only to the northern component of the I.A.U. Debes  
Kästner                      Now applies only to the southern component of the I.A.U. Kästner  
Heraclitus                      Now includes I.A.U. Heraclitus B  
Wilkins                      Small "bay" on south-east not now included

f) Names of formations for which I.A.U. map is not explicit; identification used is that of the original authority.

<u>Name</u>	<u>Authority</u>	<u>Name</u>	<u>Authority</u>
Autumni (Mare)	Franz	Pingré	Schröter
Cordilleras (Mountains)	Mädler	Régnault	Schmidt
Galvani	Schmidt	Seneca	Mädler
Hausen	Schröter	Ulugh Beigh	Mädler
Legentil	Schröter	Veris (Mare)	Franz
Marco Polo	Mädler	Wolff (Mount)	Schröter

**TABLE IV**  
**NUMBERED FORMATIONS**

		Pr. — Promontorium			Mt. — Mount		
1	Zeno	48	Cook	95	Lemonnier	142	Borda
2	Struve	49	Biot	96	Littrow	143	Reichenbach
3	Schumacher	50	Wrottesley	97	Maraldi	144	Neander
4	Messala	51	Petavius	98	Macrobius	145	Piccolomini
5	Geminus	52	Snellius	99	Franz	146	Rothmann
6	Bernouilli	53	Hase	100	Vitruvius	147	Lindenau
7	Berosus	54	Palitzsch	101	Argaeus (Mt.)	148	Stiborius
8	Gauss	55	Phillips	102	Dawes	149	Riccus
9	Hahn	56	Humboldt	103	Archerusia (Pr.)	150	Wöhler
10	Burckhardt	57	Legendre	104	Plinius	151	Brenner
11	Tralles	58	Adams	105	Jansen	152	Rheita
12	Cleomedes	59	Stevinus	106	Sinas	153	Young
13	Delmotte	60	Furnerius	107	Cauchy	154	Metius
14	Seneca	61	Marinus	108	Lyell	155	Fabricius
15	Plutarch	62	Fraunhofer	109	Da Vinci	156	Janssen
16	Eimmart	63	Oken	110	Taruntius	157	Lockyer
17	Tisserand	64	Strabo	111	Secchi	158	Dove
18	Peirce	65	Thales	112	Maskelyne	159	Steinheil
19	Proclus	66	De la Rue	113	Lamont	160	Watt
20	Olivium (Pr.)	67	Endymion	114	Moltke	161	Mallet
21	Lavinium (Pr.)	68	Mercurius	115	Censorinus	162	Vega
22	Glaisher	69	Carrington	116	Messier	163	Peirescius
23	Lick	70	Hooke	117	Pickering, W.	164	Brisbane
24	Yerkes	71	Shuckburgh	118	Lubbock	165	Reimarus
25	Picard	72	Chevallier	119	Torricelli	166	Hanno
26	Agarum (Pr.)	73	Atlas	120	Hypatia	167	Pontécoulant
27	Alhazen	74	Hercules	121	Cyrillus	168	Biela
28	Hansen	75	Bürg	122	Theophilus	169	Vlacq
29	Condorcet	76	Plana	123	Mädler	170	Rosenberger
30	Neper	77	Mason	124	Daguerre	171	Hagecius
31	Auzout	78	Grove	125	Isidorus	172	Cusanus
32	Firmicus	79	Williams	126	Capella	173	Petermann
33	Schubert	80	Oersted	127	Gaudibert	174	Baillaud
34	Apollonius	81	Cepheus	128	Gutenberg	175	Euctemon
35	Webb	82	Franklin	129	Goclenius	176	Scoresby
36	Maclaurin	83	Berzelius	130	Magelhaens	177	Main
37	Kästner	84	Maury	131	Bellot	178	Gioja
38	Langrenus	85	Hall	132	Colombo	179	Challis
39	Lapeyrouse	86	Bond, G.	133	Bohnenberger	180	Meton
40	Ansgarius	87	Daniell	134	Monge	181	Barrow
41	Lohse	88	Luther	135	Santbech	182	Goldschmidt
42	Crozier	89	Posidonius	136	Rosse	183	Bond, W.
43	McClure	90	Chacornac	137	Fracastorius	184	Neison
44	Vendelinus	91	Kirchhoff	138	Beaumont	185	Peters
45	Behaim	92	Newcomb	139	Catharina	186	Moigno
46	Hecataeus	93	Debes	140	Polybius	187	Arnold
47	Holden	94	Römer	141	Weinek	188	Schwabe



189	Gärtner	239	Dembowski	290	Apianus	344	Boguslawsky
190	Democritus	240	Godin	291	Playfair	345	Demonax
191	Kane	241	Agrippa	292	Azophi	346	Schomberger
192	Mayer, C.	242	Tempel	293	Abenezra	347	Simpelius
193	Archytas	243	Whewell	294	Geber	348	Curtius
194	Protagoras	244	Cayley	295	Sacrobosco	349	Mouchez
195	Sheepshanks	245	De Morgan	296	Fermat	350	Carpenter
196	Galle	246	D'Arrest	297	Pons	351	Anaximenes
197	Baily	247	Dionysius	298	Wilkins	352	Philolaus
198	Mitchell	248	Ritter	299	Pontanus	353	Cassini, J.
199	Aristoteles	249	Sabine	300	Poisson	354	Anaxagoras
200	Egede	250	Schmidt	301	Werner	355	Epigenes
201	Trouvelot	251	Rhaeticus	302	Aliacensis	356	Timæus
202	Eudoxus	252	Lade	303	Zagut	357	Birmingham
203	Lamèch	253	Theon senior	304	Rabbi Levi	358	Fontenelle
204	Alexander	254	Theon junior	305	Celsius	359	Condamine
205	Calippus	255	Delambre	306	Goodacre	360	Plato
206	Cassini	256	Alfraganus	307	Gemma Frisius	361	Maupertuis
207	Piton (Mt.)	257	Taylor	308	Walter	362	Laplace (Pr.)
208	Theaetetus	258	Saunders	309	Nonius	363	Pico (Mt.)
209	Aristillus	259	Pickering, E.	310	Kaiser	364	Blanc (Mt.)
210	Autolycus	260	Horrocks	311	Fernelius	365	Deville (Pr.)
211	Fresnel (Cape)	261	Hipparchus	312	Miller	366	Agassiz (Pr.)
212	Linné	262	Seeliger	313	Nasireddin	367	Piazzi Smyth
213	Hadley (Mt.)	263	Réaumur	314	Stöfler	368	Kirch
214	Aratus	264	Gyldén	315	Faraday	369	Leverrier
215	Conon	265	Müller	316	Maurolycus	370	Helicon
216	Sulpicius Gallus	266	Halley	317	Buch	371	Archimedes
217	Bessel	267	Hind	318	Büsching	372	Beer
218	Deseilligny	268	Zöllner	319	Nicolai	373	Feuillée
219	Tacquet	269	Kant	320	Barocius	374	Timocharis
220	Menelaus	270	Descartes	321	Licetus	375	Lambert
221	Auwers	271	Abulfeda	322	Heraclitus	376	Pytheas
222	Manilius	272	Dollond	323	Cuvier	377	Wallace
223	Ross	273	Anděl	324	Clairaut	378	Bradley (Mt.)
224	Boscovich	274	Ritchey	325	Baco	379	Huygens (Mt.)
225	Julius Caesar	275	Albategnius	326	Breislak	379a	Ampère (Mt.)
226	Sosigenes	276	Klein	327	Ideler	380	Serao (Mt.)
227	Maclear	277	Parrot	328	Spallanzani	381	Wolff (Mt.)
228	Arago	278	Vogel	329	Pitiscus	382	Marco Polo
229	Manners	279	Burnham	330	Hommel	383	Eratosthenes
230	Ariadaeus	280	Tacitus	331	Nearch	384	Gay-Lussac
231	Silberschlag	281	Almanon	332	Asclepi	385	Copernicus
232	Hyginus	282	Argelander	333	Tannerus	386	Fauth
233	Schneckenberg (Mt.)	283	Airy	334	Jacobi	387	Stadius
234	Ukert	284	Donati	335	Lilius	388	Bode
235	Chladni	285	Faye	336	Zach	389	Pallas
236	Bruce	286	Delaunay	337	Kinau	390	Murchison
237	Blagg	287	Lacaille	338	Pentland	391	Schröter
238	Triesnecker	288	Blanchinus	339	Manzinus	392	Gambart
		289	Krusenstern	340	Mutus	393	Sömmering
				341	Boussingault	394	Mösting
				342	Helmholtz	395	Turner
				343	Neumayer	396	Lalande

397	Flammarion	451	Blancanus	505	Encke	559	Dechen
398	Oppolzer	452	Scheiner	506	Kunowsky	560	Gerard
399	Spörer	453	Rost	507	Hortensius	561	Harding
400	Herschel	454	Bettinus	508	Reinhold	562	Rümker
401	Fra Mauro	455	Kircher	509	Lansberg	563	Lavoisier
402	Parry	456	Wilson	510	Flamsteed	564	Naumann
403	Bonpland	457	Klaproth	511	Wichmann	565	Ulugh Beigh
404	Guericke	458	Casatus	512	Letronne	566	Lichtenberg
405	Davy	459	Gruemberger	513	Herigonius	567	Briggs
406	Palisa	460	Cysatus	514	Euclides	568	Struve, O.
407	Ptolemaeus	461	Moretus	515	Darney	569	Seleucus
408	Alphonsus	462	Short	516	Gassendi	570	Schiaparelli
409	Alpetragius	463	Newton	517	Agatharchides	571	Herodotus
410	Lassell	464	Malapert	518	Lubiniezky	572	Aristarchus
411	Opelt	465	Cabeus	519	Bullialdus	573	Krafft
412	Arzachel	466	Legentil	520	Loewy	574	Vasco da Gama
413	Taenarium (Pr.)	467	Anaximander	521	Hippalus	575	Cardanus
414	Gould	468	Pythagoras	522	König	576	Galilaei
415	Kies	469	Herschel, J.	523	Kelvin (Cape)	577	Marius
416	Wolf	470	Horrebow	524	Puiseux	578	Suess
417	Nicollet	471	Robinson	525	Doppelmayr	579	Reiner
418	Birt	472	South	526	Palmieri	580	Olbers
419	Thebit	473	Babbage	527	Lee	581	Cavalerius
420	Purbach	474	Cleostratus	528	Vitello	582	Hevelius
421	Regiomontanus	475	Xenophanes	529	Dunthorne	583	Lohrmann
422	Lippershey	476	Oenopides	530	Campanus	584	Hermann
423	Hesiodus	477	Harpalus	531	Mercator	585	Damoiseau
424	Pitatus	478	Foucault	532	Marth	586	Grimaldi
425	Weiss	479	Bouguer	533	Ramsden	587	Riccioli
426	Hell	480	Bianchini	534	Lepaute	588	Rocca
427	Deslandres	481	Sharp	535	Capuanus	589	Sirsalis
428	Lexell	482	Louville	536	Elger	590	Hansteen
429	Ball	483	Mairan	537	Clausius	591	Billy
430	Gauricus	484	Heraclides (Pr.)	538	Drebbel	592	Fontana
431	Wurzelbauer	485	Carlini	539	Schickard	593	Crüger
432	Cichus	486	Herschel, C.	540	Mee	594	Zupus
433	Heinsius	487	Heis	541	Hainzel	595	De Vico
434	Sasserides	488	Gruithuisen	542	Epimenides	596	Mersenius
435	Orontius	489	Wollaston	543	Haidinger	597	Darwin
436	Huggins	490	Krieger	544	Bayer	598	Eichstadt
437	Saussure	491	Angström	545	Schiller	599	Byrgius
438	Pictet	492	Delisle	546	Nöggerath	600	Henry, Prosper
439	Tycho	493	Lahire (Mt.)	547	Wargentini	601	Henry, Paul
440	Wilhelm	494	Diophantus	548	Nasmyth	602	Cavendish
441	Lagalla	495	Prinz	549	Phocylides	603	De Gasparis
442	Montanari	496	Brayley	550	Pingré	604	Liebig
443	Longomontanus	497	Euler	551	Segner	605	Fourier
444	Brown	498	Draper	552	Zucchius	606	Vieta
445	Street	499	Banat (Cape)	553	Weigel	607	Lagrange
446	Proctor	500	Mayer, T.	554	Bailly	608	Bouvard
447	Maginus	501	Bessarion	555	Hausen	609	Piazzi
448	Deluc	502	Milichius	556	Repsold	610	Lacroix
449	Clavius	503	Kepler	557	Régnauld	611	Lehmann
450	Rutherford	504	Maestlin	558	Galvani	612	Inghirami

**TABLE V**

**NAMED FORMATIONS, GIVING NUMBERS AND FIELDS**

**A. CRATERS**

<i>Name</i>	<i>No.</i>	<i>Field</i>	<i>Name</i>	<i>No.</i>	<i>Field</i>	<i>Name</i>	<i>No.</i>	<i>Field</i>
Abenezra	293	C6	Baco	325	C7	Brenner	151	B7
Abulfeda	271	C5	Baillaud	174	C1	Briggs	567	F3
Adams	58	A6-A7	Bailly	554	D8-E8	Brisbane	164	B7
Agatharchides	517	E6	Baily	197	B2-C2	Brown	444	D7
Agrippa	241	C4	Ball	429	D7	Bruce	236	C4
Airy	283	C6	Barocius	320	C7	Buch	317	C7
Albategnius	275	C5	Barrow	181	C1	Bullialdus	519	D6-E6
Alexander	204	C2	Bayer	544	E7	Burckhardt	10	A3
Alfraganus	256	C5	Beaumont	138	B6	Bürg	75	B2-C2
Alhazen	27	A4	Beer	372	D3	Burnham	279	C5
Aliacensis	302	C6	Behaim	45	A6	Büsching	318	C7
Almanon	281	C5-C6	Bellot	131	B5	Byrgius	599	F6
Alpetragius	409	D5-D6	Bernouilli	6	A2	Cabeus	465	D8
Alphonsus	408	D5	Berosus	7	A2	Calippus	205	C2
Anaxagoras	354	D1	Berzelius	83	B2	Campanus	530	E6
Anaximander	467	D1-E1	Bessarion	501	E4	Capella	126	B5
Anaximenes	351	D1	Bessel	217	C3	Capuanus	535	E7
Anděl	273	C5	Bettinus	454	D8-E8	Cardanus	575	F4
Angström	491	E3	Bianchini	480	E2	Carlini	485	E2
Ansgarius	40	A5	Biela	168	B8	Carpenter	350	D1
Apianus	290	C6	Billy	591	F5	Carrington	69	A2-B2
Apollonius	34	A4	Biot	49	A6	Casatus	458	D8
Arago	228	B4-C4	Birmingham	357	D1	Cassini	206	C2
Aratus	214	C3	Birt	418	D6	Cassini, J.	353	C1
Archimedes	371	D3	Blagg	237	C4	Catharina	139	B6
Archytas	193	C1	Blancanus	451	D8	Cauchy	107	B4
Argelander	282	C5-C6	Blanchinus	288	C6	Cavalerius	581	F4
Ariadaeus	230	C4	Bode	388	D4	Cavendish	602	F6
Aristarchus	572	F3	Boguslawsky	344	C8	Cayley	244	C4
Aristillus	209	C2	Bohnenberger	133	B5-B6	Celsius	305	C7
Aristoteles	199	C2	Bond, G.	86	B2	Censorinus	115	B5
Arnold	187	C1	Bond, W.	183	C1-D1	Cepheus	81	B2
Arzachel	412	D6	Bonpland	403	D5	Chacornac	90	B3
Asclepi	332	C8	Borda	142	B6	Challis	179	C1
Atlas	73	B2	Boscovich	224	C4	Chevallier	72	B2
Autolycus	210	C3	Bouguer	479	E2	Chladni	235	C4
Auwers	221	C4	Boussingault	341	C8	Cichus	432	D7
Auzout	31	A4	Bouvard	608	F7	Clairaut	324	C7
Azophi	292	C6	Brayley	496	E3	Clausius	537	E7
Babbage	473	E1	Breislak	326	C7	Clavius	449	D8

A. CRATERS—Continued

<i>Name</i>	<i>No.</i>	<i>Field</i>	<i>Name</i>	<i>No.</i>	<i>Field</i>	<i>Name</i>	<i>No.</i>	<i>Field</i>
Cleomedes	12	A3	Donati	284	C6	Gassendi	516	E5-E6
Cleostratus	474	E1	Doppelmayr	525	E6	Gaudibert	127	B5
Colombo	132	A6-B5-B6	Dove	158	B7	Gauricus	430	D6-D7
Condamine	359	D1-D2	Draper	498	E3	Gauss	8	A2
Condorcet	29	A4	Drebbel	538	E7	Gay-Lussac	384	D4
Conon	215	C3	Dunthorne	529	E6	Geber	294	C6
Cook	48	A6	Egede	200	C2	Geminus	5	A2
Copernicus	385	D4	Eichstadt	598	F6	Gemma Frisius	307	C7
Crozier	42	A5	Eimmart	16	A3	Gerard	560	F2
Crüger	593	F5-F6	Elger	536	E7	Gioja	178	C1-D1
Curtius	348	C8	Encke	505	E4	Glaisher	22	A4
Cusanus	172	C1	Endymion	67	B1-B2	Goclenius	129	B5
Cuvier	323	C7	Epigenes	355	D1	Godin	240	C4
Cyrillus	121	B5	Epimenides	542	E7	Goldschmidt	182	C1-D1
Cysatus	460	D8	Eratosthenes	383	D4	Goodacre	306	C6-C7
Daguerre	124	B5	Euclides	514	E5	Gould	414	D6
Damoiseau	585	F5	Euctemon	175	C1	Grimaldi	586	F5
Daniell	87	B2	Eudoxus	202	C2	Grove	78	B2
Darney	515	E5	Euler	497	E3	Gruemberger	459	D8
D'Arrest	246	C4	Fabricius	155	B7	Gruithuisen	488	E2
Darwin	597	F6	Faraday	315	C7	Guericke	404	D5
Da Vinci	109	B4	Fauth	386	D4	Gutenberg	128	B5
Davy	405	D5	Faye	285	C6	Gyldén	264	C5-D5
Dawes	102	B3	Fermat	296	C6	Hagecius	171	B8
Debes	93	A3-B3	Fernelius	311	C7	Hahn	9	A2-A3
Dechen	559	F2	Feuillée	373	D3	Haidinger	543	E7
De Gasparis	603	F6	Firmicus	32	A4	Hainzel	541	E7
Delambre	255	C5	Flammarion	397	D5	Hall	85	B2
De la Rue	66	B1	Flamsteed	510	E5	Halley	266	C5
Delaunay	286	C6	Fontana	592	F5-F6	Hanno	166	B8
Delisle	492	E3	Fontenelle	358	D1	Hansen	28	A4
Delmotte	13	A3	Foucault	478	E2	Hansteen	590	F5
Deluc	448	D8	Fourier	605	F6	Harding	561	F2
Dembowski	239	C4	Fracastorius	137	B6	Harpalus	477	E2
Democritus	190	C1	Fra Mauro	401	D5	Hase	53	A6
Demonax	345	C8	Franklin	82	B2	Hausen	555	E8
De Morgan	245	C4	Franz	99	B3	Hecataeus	46	A6
Descartes	270	C5	Fraunhofer	62	A7	Heinsius	433	D7
Deseilligny	218	C3	Furnerius	60	A7	Heis	487	E2
Deslandres	427	D6-D7	Galilaei	576	F4	Helicon	370	D2
De Vico	595	F6	Galle	196	C1	Hell	426	D6
Dionysius	247	C4	Galvani	558	F2	Helmholtz	342	C8
Diophantus	494	E3	Gambart	392	D4	Henry, Paul	601	F6
Dollond	272	C5	Gärtner	189	C1	Henry, Prosper	600	F6
						Heraclitus	322	C7
						Hercules	74	B2
						Herigonius	513	E5
						Hermann	584	F5

A. CRATERS—Continued

<i>Name</i>	<i>No.</i>	<i>Field</i>	<i>Name</i>	<i>No.</i>	<i>Field</i>	<i>Name</i>	<i>No.</i>	<i>Field</i>
Herodotus	571	F3	Lagrange	607	F6-F7	Malapert	464	C8-D8
Herschel	400	D5	Lalande	396	D5	Mallet	161	B7
Herschel, C.	486	E2	Lambert	375	D3	Manilius	222	C4
Herschel, J.	469	D1-E1	Lamèch	203	C2	Manners	229	C4
Hesiodus	423	D6	Lamont	113	B4	Manzinus	339	C8
Hevelius	582	F4	Lansberg	509	E4-E5	Maraldi	97	B3
Hind	267	C5	Langrenus	38	A5	Marco Polo	382	D4
Hippalus	521	E6	Lapeyrouse	39	A5	Marinus	61	A7
Hipparchus	261	C5	Lassell	410	D5	Marius	577	F4
Holden	47	A6	Lavoisier	563	F2	Marth	532	E6
Hommel	330	B8-C8	Lee	527	E6	Maskelyne	112	B4
Hooke	70	B2	Legendre	57	A6	Mason	77	B2
Horrebow	470	E1	Legentil	466	D8	Maupertuis	361	D2
Horrocks	260	C5	Lehmann	611	F7	Maurolycus	316	C7
Hortensius	507	E4	Lemonnier	95	B3	Maury	84	B2
Huggins	436	D7	Lepaute	534	E7	Mayer, C.	192	C1
Humboldt	56	A6	Letronne	512	E5	Mayer, T.	500	E4
Hyginus	232	C4	Leverrier	369	D2	McClure	43	A5-B5
Hypatia	120	B5	Lexell	428	D7	Mee	540	E7
Ideler	327	C7	Licetus	321	C7	Menelaus	220	C3-C4
Inghirami	612	F7	Lichtenberg	566	F2-F3	Mercator	531	E6
Isidorus	125	B5	Lick	23	A4	Mercurius	68	B2
Jacobi	334	C8	Liebig	604	F6	Mersenius	596	F6
Jansen	105	B4	Lilius	335	C8	Messala	4	A2
Janssen	156	B7	Lindenau	147	B6-B7-C6	Messier	116	A5
Julius Caesar	225	C4	Linné	212	C3	Metius	154	B7
Kaiser	310	C7	Lippershey	422	D6	Meton	180	C1
Kane	191	C1	Littrow	96	B3	Milichius	502	E4
Kant	269	C5	Lockyer	157	B7	Miller	312	C7
Kästner	37	A5	Loewy	520	E6	Mitchell	198	C2
Kepler	503	E4	Lohrmann	583	F5	Moigno	186	C1
Kies	415	D6-E6	Lohse	41	A5	Moltke	114	B5
Kinau	337	C8	Longomontanus	443	D7	Monge	134	A6-B6
Kirch	368	D2	Louville	482	E2	Montanari	442	D7
Kircher	455	D8	Lubbock	118	B5	Moretus	461	D8
Kirchhoff	91	B3	Lubiniezky	518	E6	Mösting	394	D5
Klaproth	457	D8	Luther	88	B2	Mouchez	349	D1
Klein	276	C5	Lyell	108	B4	Müller	265	C5
König	522	E6	Maclaurin	36	A5	Murchison	390	C4-D4
Krafft	573	F3-F4	Maclear	227	C4	Mutus	340	C8
Krieger	490	E3	Macrobius	98	B3	Nasireddin	313	C7-D7
Krusenstern	289	C6	Mädler	123	B5	Nasmyth	548	E7
Kunowsky	506	E4	Maestlin	504	E4	Naumann	564	F2
Lacaille	287	C6	Magelhaens	130	B5	Neander	144	B6
Lacroix	610	F7	Maginus	447	D7	Nearch	331	B8-C8
Lade	252	C5	Main	177	C1	Neison	184	C1
Lagalla	441	D7	Mairan	483	E2	Neper	30	A4

A. CRATERS—Continued

<i>Name</i>	<i>No.</i>	<i>Field</i>	<i>Name</i>	<i>No.</i>	<i>Field</i>	<i>Name</i>	<i>No.</i>	<i>Field</i>
Neumayer	343	C8	Pontanus	299	C6	Schmidt	250	C4
Newcomb	92	B3	Pontécoulant	167	B8	Schomberger	346	C8
Newton	463	D8	Posidonius	89	B2-B3	Schröter	391	D4
Nicolai	319	B7-C7	Prinz	495	E3	Schubert	33	A4
Nicollet	417	D6	Proclus	19	A3-B4	Schumacher	3	A2-B2
Nöggerath	546	E7	Proctor	446	D7	Schwabe	188	C1
Nonius	309	C7	Protagoras	194	C1	Scoresby	176	C1
Oenopides	476	E1	Ptolemaeus	407	C5-D5	Secchi	111	B4
Oersted	80	B2	Puiseux	524	E6	Seeliger	262	C5
Oken	63	A7	Purbach	420	D6	Segner	551	E8
Olbers	580	F4	Pythagoras	468	E1	Seleucus	569	F3
Opelt	411	D5-D6	Pytheas	376	D3	Seneca	14	A3
Oppolzer	398	C5-D5	Rabbi Levi	304	B7-C7	Sharp	481	E2
Orontius	435	D7	Ramsden	533	E6-E7	Sheepshanks	195	C1
Palisa	406	D5	Réaumur	263	C5	Short	462	D8
Palitzsch	54	A6	Regiomontanus	421	C6-D6	Shuckburgh	71	B2
Pallas	389	D4	Régnauld	557	F2	Silberschlag	231	C4
Palmieri	526	E6	Reichenbach	143	B6	Simpelius	347	C8
Parrot	277	C5	Reimarus	165	B7	Sinas	106	B4
Parry	402	D5	Reiner	579	F4	Sirsalis	589	F5
Peirce	18	A3	Reinhold	508	E4	Snellius	52	A6
Peirescius	163	A7-B7	Repsold	556	E2-F2	Sömmering	393	D4-D5
Pentland	338	C8	Rhaeticus	251	C4-C5	Sosigenes	226	C4
Petavius	51	A6	Rheita	152	B7	South	472	E1
Petermann	173	C1	Riccioli	587	F5	Spallanzani	328	C7
Peters	185	C1	Riccus	149	B7	Spörer	399	D5
Phillips	55	A6	Ritchey	274	C5	Stadius	387	D4
Philolaus	352	D1	Ritter	248	C4	Steinheil	159	B7
Phocylides	549	E7-E8	Robinson	471	E1	Stevinus	59	A7-B6
Piazzi	609	F7	Rocca	588	F5	Stiborius	148	B7
Piazzi Smyth	367	D2	Römer	94	B3	Stöfler	314	C7
Picard	25	A4	Rosenberger	170	B8	Strabo	64	B1
Piccolomini	145	B6	Ross	223	B4-C4	Street	445	D7
Pickering, E.	259	C5	Rosse	136	B6	Struve	2	A2
Pickering, W.	117	B5	Rost	453	D8	Struve, O.	568	F3
Pictet	438	D7	Rothmann	146	B6	Suess	578	F4
Pingré	550	E8	Rutherford	450	D8	Sulpicius Gallus	216	C3
Pitatus	424	D6	Sabine	249	C4	Tacitus	280	C5-C6
Pitiscus	329	B7-C7	Sacrobosco	295	C6	Tacquet	219	C3
Plana	76	B2	Santbech	135	B6	Tannerus	333	C8
Plato	360	D2	Sasserides	434	D7	Taruntius	110	A4-B4
Playfair	291	C6	Saunder	258	C5	Taylor	257	C5
Plinius	104	B4	Saussure	437	D7	Tempel	242	C4
Plutarch	15	A3	Scheiner	452	D8	Thales	65	B1
Poisson	300	C6	Schiaparelli	570	F3	Theaetetus	208	C2
Polybius	140	B6	Schickard	539	E7-F7	Thebit	419	D6
Pons	297	C6	Schiller	545	E7-E8	Theon Junior	254	C5

A. CRATERS—Continued		
<i>Name</i>	<i>No.</i>	<i>Field</i>
Theon Senior	253	C5
Theophilus	122	B5
Timaeus	356	C1-D1
Timocharis	374	D3
Tisserand	17	A3
Torricelli	119	B5
Tralles	11	A3
Triesnecker	238	C4
Trouvelot	201	C2
Turner	395	D5
Tycho	439	D7
Ukert	234	C4
Ulugh Beigh	565	F2
Vasco da Gama	574	F4
Vega	162	B7
Vendelinus	44	A5-A6
Vieta	606	F6
Vitello	528	E6
Vitruvius	100	B3
Vlacq	169	B7-B8
Vogel	278	C5
Wallace	377	D3
Walter	308	C6-C7
Wargentin	547	E7
Watt	160	B7
Webb	35	A5
Weigel	553	E8
Weinek	141	B6
Weiss	425	D6
Werner	301	C6
Whewell	243	C4
Wichmann	511	E5
Wilhelm	440	D7
Wilkins	298	C6
Williams	79	B2
Wilson	456	D8
Wöhler	150	B7
Wolf	416	D6
Wollaston	489	E3
Wrottesley	50	A6
Wurzelbauer	431	D6-D7
Xenophanes	475	E1
Yerkes	24	A4
Young	153	B7
Zach	336	C8
Zagut	303	C6-C7
Zeno	1	A2
Zöllner	268	C5

<i>Name</i>	<i>No.</i>	<i>Field</i>
Zucchius	552	E8
Zupus	594	F6
B. PROMONTORIES AND CAPES		
Pr. Agarum	26	A4
Pr. Agassiz	366	C2
Pr. Archerusia	103	B3
Cape Banat	499	E3
Pr. Deville	365	C2
Cape Fresnel	211	C3
Pr. Heraclides	484	E2
Cape Kelvin	523	E6
Pr. Laplace	362	D2
Pr. Lavinium	21	A4
Pr. Olivium	20	A4
Pr. Taenarium	413	D6
C. PEAKS		
Ampère	379 <sup>a</sup>	D3
Argaeus	101	B3
Blanc	364	C2-D2
Bradley	378	C3-D3
Hadley	213	C3
Huygens	379	D3
Lahire	493	E3
Pico	363	D2
Piton	207	D2
Rümker	562	F2
Schneckenberg	233	C4
Serao	380	D3
Wolff	381	D3
D. MOUNTAIN RANGES		
Alps		C2-D2
Altai Scarp		B6-C6
Apennines		C3-D3
Carpathians		D4- E4
Caucasus Mts.		C2
Cordilleras		F5- F6
D'Alembert Mts.		F5
Doerfel Mts.		D8- E8
Haemus Mts.		C3
Harbinger Mts.		E3
Hercynian Mts.		F3
Jura Mts.		E2
Leibnitz Mts.		C8-D8
Pyrenees		B5-B6
Riphaeus		E5
Spitzbergen		D2
Straight Range		D2
Straight Wall		D6

<i>Name</i>	<i>Field</i>
Taurus Mts.	B3
Teneriffe Mts.	D2
E. SINUS	
Sinus Aestuum	D4
Sinus Iridum	E2
Sinus Medii	C4-D4
Sinus Roris	E1- E2
F. PALUDES	
Palus Epidemiarum	D6- E6- E7
Palus Putredinis	C3-D3
Palus Somni	B3-B4
G. LACUS	
Lacus Mortis	B2-C2
Lacus Somniorum	B2
H. MARIA	
Mare Aestatis	F5
Mare Anguis	A3
Mare Australe	A7- B7- B8
Mare Autumni	F5-F6
Mare Crisium	A3-A4
Mare Fecunditatis	A4-A5-A6-B5
Mare Frigoris	C1-D1
Mare Humboldtianum	B1
Mare Humorum	E6
Mare Imbrium	D2-D3- E2- E3
Mare Marginis	A3-A4
Mare Nectaris	B5- B6
Mare Novum	A3
Mare Nubium	D5-D6
Oceanus Procellarum	E3- E4- E5- F2- F3- F4- F5
Mare Serenitatis	B3-C2-C3
Mare Smythii	A4-A5
Mare Spumans	A4
Mare Tranquillitatis	B4-B5-C4
Mare Undarum	A4
Mare Vaporum	C4
Mare Veris	F5- F6
I. RILLES	
Ariadaeus Rille	C4
Byrgius Rille	F6
Hyginus Rille	C4
Sirsalis Rille	F5- F6
J. VALLEYS	
Alpine Valley	C2
Rheita Valley	B7
Schröter's Valley	F3