the spectrum

February 1967 BUFFALO ASTRONOMICAL ASSOCIATION EDITOR B. COOK

FEBRUARY MEETING

The regular monthly meeting of the Buffalo Astronomical Association will be held on February 10th at 8:00 P.M. in the club rooms of the Buffalo Museu Museum of Science.

Dr. Fred Price will speak on the subject "The Igneous Origin of Lunar Surface Features - The Modern Syn Synthesis." The increasing strength of the igneous theory of formation of lunar features will be discussed in parellel with the rival meteoritic hypothesis and the new selenology based on these findings will be broadly surveyed.

After the meeting there will be the usual coffee, tea and donghnuts giving us a change to become better acquainted with our new members.

SECTION MEETINGS

On January 27th the Advanced Study Section met to continue its discussio sion of the Milky Way. The general makeup of our galaxy - its nucleus, arms, star types and rotation. Next month, on February 24th, the meeting will be held at 8:30 P.M. The topic under discussion will be the distribution of Variable and Binary stars. Members are asked to read up on this subject and ask prepared with comments and questions.

The Lunar Section also met on the evening of January 27th. There were threettalks on the general subject of "Lunar Riddles". Edith Geiger had additional observations of "The missing Wash bowl" in Cassini A and some interesting questions about the crater Vitello. Dr. Price talked about the crater Vieta and discussed the discrepancies of drawings by various observers copies of which he used to illustrate his talk. Ernst Both spoke on "Aristillus and the Dark Streak" which seems to change its appearance quite drastically under varying conditions of illumination. Among the members who reported on recent activites was Walter Semerau who showed his photographs of the moon and spoke of the pro problems connected with this work. The next meeting of the Lunar Section will be held in March. Edward Lindberg mentioned his unsuccessful attempts to observe the purple glow on the west wall of Aristarchus mentioned by Bartlett.)

THE INSTRUMENT SECTION

The Instrument Section will hold its next meeting on Friday February 24th at 7:00 P.M. in the Sience Museum.

CONVENTION

The Convention Committee can use help. It has been requested that we make ourselves available to the committee chairmen. For your convenience the Spectrum ispublishing again, their names so you can make known the committee with which you wish to work.

Publicity – Paul Redding
Exhibits – Ed Stoklosa
Printing – Dick Zygmunt
Papers – Ron Clippinger

FOR SALE

Wayne J, Lutz has a 4" refractor telescope S-15, excellent condition, Vernonscope, complete with equatorial mount, 4 eyepieces, star diagonal and a 10x42 finder, which he would like to sell for $250.00. He can be reached by writing him at Box 241 Tower Hall, State University of New York at Buffalo; or you may telephone him at 831-3281.

GALACTIC ROTATION

There are few areas in Astronomy about which the experts feel they know all the answers. Although much scientific work has been done on the rotation of spiral galaxies, the experts do not agree.

Attempts have been made to solve the problem of the direction of rotation of the spirals by spectroscopic measurements indicating which end of the major axis is approaching and which receding. But in order to discover its direction of rotation we must know its actual orientation in space, so that we can distinguish its nearer edge from that which lies on the far side of the nucleus.

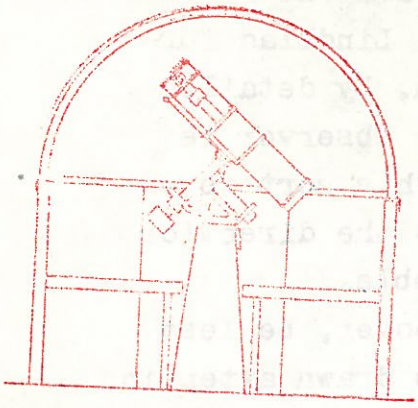
Now there is in fact something that provides this very information – the absorbing band which is projected against the nucleus of edge-on spirals. But if a galaxy is exactly edge on, its structure cannot be seen, and the problem is indeterminate. On the other hand, when the plane of the galaxy is sufficiently inclined to the line of sight for the arrangement of the arms to be seen clearly, the absorbing band is displaced by perspective above or below the nucleus, and now it cannot be seen.; thus the spatial orientation of the galaxy still evades us. However, as a result of systematic search of the Mount Wilson files, Hubble in 1942 succeeded in finding several photographs of nebulae whose approaching and receding sides had been determined spectroscopically, and whose inclination to the line of sight was just great enough for the layout of the arms to be seen, but not so great that the peripheral absorbing band, indication the near side, was invisible.

By means of these he was able to demonstrate that all the spiral nebulae rotate in the same sense, and that this is such that the arms trail behind as the nucleus rotates; in other words, the direction of rotation is such as would tend to wind up the arms.

However, the Swedish authority, Bertil Lindblad at the present time rejects this completely. He contends that in spirals which are sufficiently inclined for the layout of their arms to be seen, the zone of strongest absorption does not indicate the near side but theside furthest from the observer, since

this zone does not lie outside the outermost spiral arm (as Hubble thought), but between it and the arm next inside it. Lindblad furthermore believes that he has been able to establish, by detailed photometric analysis, that the side further from the observer is redder than the other, and since a color excess of this sort is encountered in regions of absorption he concludes that the direction of rotation is the opposite of that advocated by Hubble.

The problem thus remains unresolved. It may, moreover, be less simple than was originally thought, for Lindblad has drawn attention to the case of a nebula whose outer arms unwind in the opposite direction to the inner, and within our Galaxy itself evidence is accumulating that some stars revolve in the opposite direction to the majority.



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* * LUNAR SECTION NOTES * * No. 2, 1967 - February

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PLATO: MYSTERIES REMAINING: Although the lunar crater Plato has been studied by several generations of observers, there are a number of problems which have almost been ignored. As a general introduction Alika K. Herring's "Observing the Moon - Plato" (Sky and Telescope 27, April 1964, 250-252) can be recommended, also Joseph Ashbrook's "A Plato Illusion" (ibid. 19, December 1959, 92), which dispels some strongly entrenched, but erroneous views concerning the photometric behavior of the floor. Herring's article reproduces an excellent series of sunrise views by Philipp Fauth. Here we will point out some of the remaining mysteries which need clarification.

1. Peculiar color phenomenon: Robert Barker, "The Harvests of Plato," Popular Astronomy 48, 1940, 19-21. Barker, a lunar and planetary observer of note, noticed a peculiar golden-brown color on the west-southwest (astronomical sense) wall, about 1-5/8 days after first quarter on December 12, 1937, colong. 27°8 (12.6-inch Calver reflector). He wrote: "I saw a strongly marked streak of orange-brown on the west wall ... which remained constant whatever the eyepiece and power employed. This streak ... consisted of closely interwoven veins, forming a network." (About 4 hours later = colong. 29°8) "it had extended irregularly down the wall, westwards" (from the context it appears that the outside wall is meant, unless Barker intended it to read "eastwards" as might be expected from the following). "On January 16, 1938 the colored area was again easily seen; it had ... extended along the wall beyond A and B" (see map) "and on the next night it had overflowed down ... to the floor, presenting a brownish gold-veined surface of color." The phenomenon was confirmed by Barker's son and observed independently by W. E. Fox (Newark, England) on February 14, 1938 (no time or instrument given. The colong. for 0h UT on January 16 was 84°7, and for the same time on February 14 = 77°4). It would be interesting to learn whether this coloration occurs regularly, indicating a peculiar surface tint, or whether it is ephemeral and anomalous, indicating some form of activity.

2. Large, low dome on the eastern floor: Alika K. Herring, "An Unusual Observation of Plato," Sky and Telescope 30, September 1965, 184. Using a 12.5-inch reflector at 419 X, Herring observed a large (ca. 1/3 of floor diameter), low, dome-like structure on June 8, 1965, at colong. 14°3 which was photographed by Steve Larson with a 5.5-inch refractor. Apparently this object had not been observed before, although it coincides approximately with a well-known "bright sector." What are the precise conditions under which it is observable? For how long can it be seen? When Herring detected it, the Moon's libration in long. was +6°2, in lat. -6°2.

3. Rilles on the floor: Philipp Fauth, The Moon in Modern Astronomy, N.Y. 1909, 115. The history of suspected rilles on the floor is somewhat peculiar. No recent observations exist of which I am aware, and Fauth's map is by far the most detailed. Apparently the first rille-like object was noticed independently by L. Brenner (1) and Rev. W. R. Waugh (2) in 1895. Brenner used a 7-inch refractor and Waugh a 12¼-inch reflector.

This rille (delineated somewhat differently by the two observers) is nearly the same as that shown by Fauth ("a" on our map), except that Brenner placed it closer to the wall. It was also observed by P. B. Molesworth in 1897 with a 9½-inch Calver reflector, but his observation was not published until 1916 (3). Like Brenner, Molesworth placed it close to the wall, almost at the base of it. Rille "b" is shown only by Fauth, although it may vaguely correspond to a "cleft-like" white marking noted in 1896 by Rev. T. H. Foulkes (2) with a 10.5-inch Calver reflector. Fauth used a 6.5 and a 7-inch refractor. It is interesting to note that of recent observers only Herring shows anything of a rille, namely the short segment of "a" running from the west wall to the craterlet. He called it "extremely delicate," using his 12.5-inch reflector at 325 X (4). The puzzling thing about this rille is that Herring, observing under good conditions at Haleakala, Hawaii, with a good-sized instrument, had difficulty seeing what Brenner, Molesworth, and Fauth observed more completely with smaller instruments. These three observers were in the habit of observing the waning Moon and perhaps this is a clue to the puzzle: perhaps this rille is more readily visible under evening illumination (unless one postulates that the rille was more easily visible around the turn of the century).

References: (1) Brenner, L., "Lunar Observations at the Manora Observatory: II," English Mechanic 61, 1895, 12. (2) Foulkes, Rev. T. H., "The Floor of Plato," Journal BAA 6, 1896, 210-211. (3) Goodacre, W., Seventh Report of the Lunar Section, Memoirs BAA 20, 1916, plate IV. (4) Sky and Telescope 27, April 1964, 251.

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CURRENT LITERATURE: Middlehurst, Barbara M. and Patrick Moore, "Lunar Transient Phenomena: Topographical Distribution," Science 155, 27 Jan. 1967, 449-451. Abstract: "The sites named in nearly 400 reports of lunar transient phenomena fall into three classes: (i) sites peripheral to the maria, (ii) ray craters, and (iii) ring plains with dark or partially dark floors; none are known in the rugged highland area of the southwest quadrant. Permanent records are few; the sites where known are consistent with the visual records." We will have a detailed report at the March meeting.

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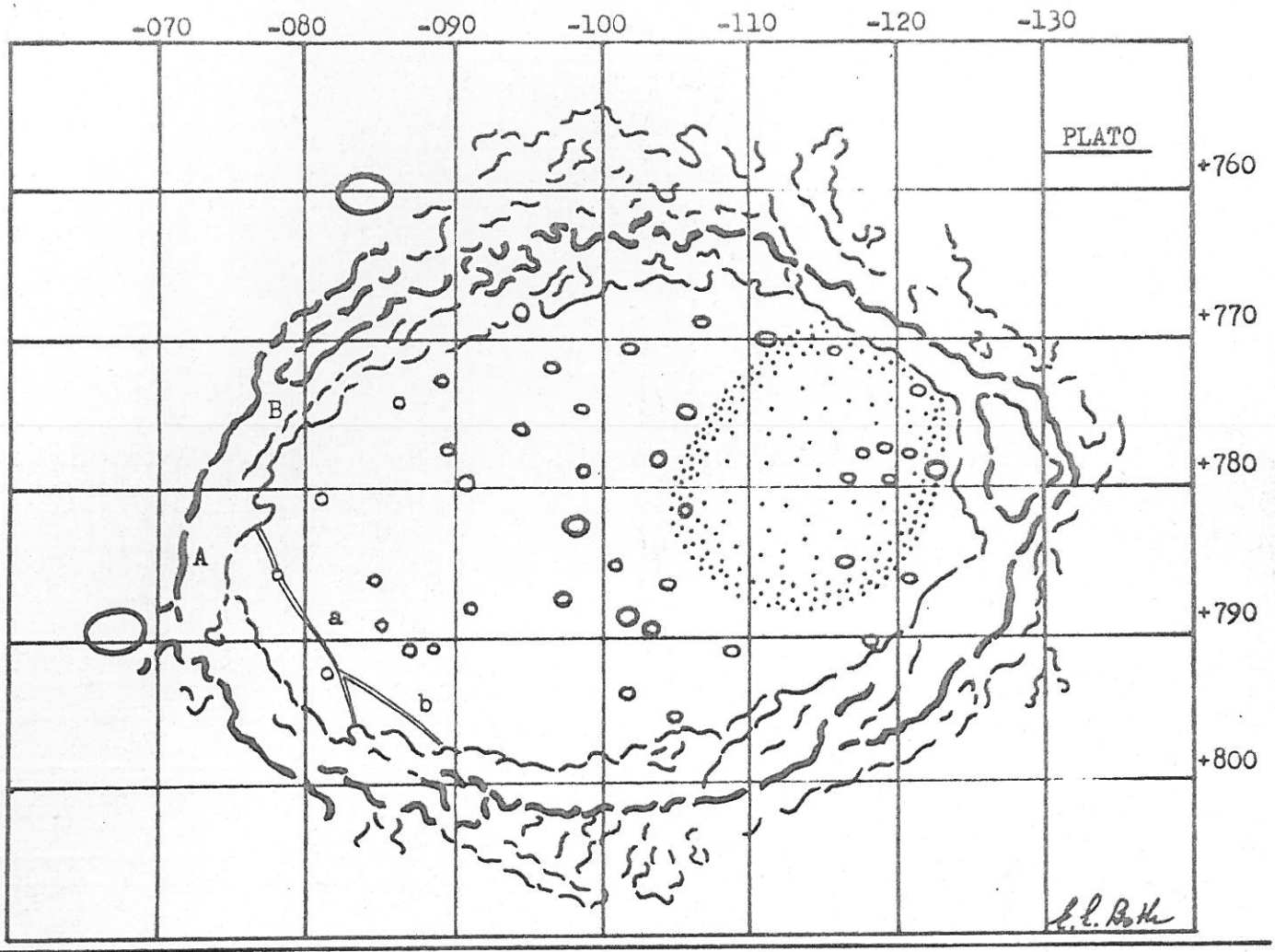
WILLIAM RADCLIFF BIRT (1804-81)

Ernst E. Both

William Radcliff Birt's name appears frequently in popular lunar literature in connection with the crater Plato and the abortive mapping project of the British Association for the Advancement of Sciences (BAAS) of one hundred years ago. The two obituaries I have used (1) contain the barest outline of his activities - the rest has to be inferred from his published articles.

Birt's early interest in astronomy centered around variable stars - observations of beta Lyrae and the discovery of the variability of alpha Cassiopeiae when he was 26 years old. Later he became known as a meteorologist; as such he was engaged by Sir John Herschel to reduce barometric observations (1839-43), resulting in a chapter "On Atmospheric Waves and Barometric Curves" in Herschel's A Manual of Scientific Enquiry (1849).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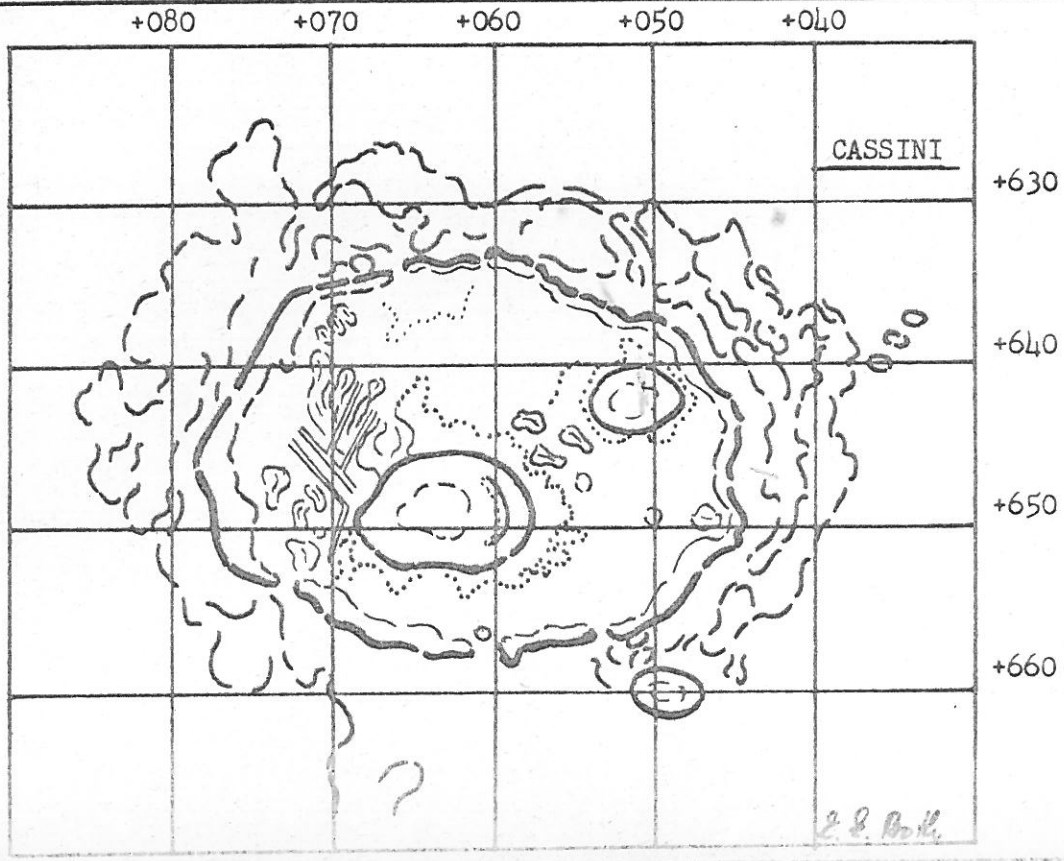
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During this period he became a Life Member of the BAAS (1841), and under its auspices he prepared five reports on atmospheric waves (1844-48). At the 1848 Swansea meeting of the BAAS, Birt was appointed to analyze the electrical observations made at Kew. The result was a 90 page report (1849). In 1850 he published "The Hurricane Guide" which developed into his "Handbook of the Law of Storms" (2).

Birt's lunar studies began around 1859 when he became a Fellow of the Royal Astronomical Society (RAS). He never owned a telescope, nor was he connected with an observatory; however, he did use a variety of instruments: in 1860 he had access to a 13-inch reflector (3); in the same year the RAS loaned Birt a 2.75-inch refractor and he was also able to observe with John Lee's 5.9-inch refractor on frequent visits to the Hartwell Observatory from January 1860 to September 1865 (4). Late in 1861 he presented the RAS with a bound manuscript entitled "The Lunar Crater Plato: Observations from January 1860 to July 1861" (5). In support of his lunar work the council of the RAS in 1863 voted some money for the construction of a 4¼-inch refractor for Birt's use, which was finished in September of that year under the supervision of Warren de la Rue (6). The following year the BAAS appointed The Lunar Committee for Mapping the Surface of the Moon at its meeting in Bath, consisting of 11 members and 31 cooperating observers (7). Birt was selected to coordinate the work, the sum of 120 pounds being allotted annually for this purpose. Edward Crossley modified his 7.3-inch refractor expressly for Birt's use (8). It was the committee's purpose "to prepare forms ... for the registration of lunar objects, for recording original observations, for facilitating the formation of a catalogue, and for computing ... the positions of objects" (9). Within a year Birt had accomplished these objectives. For the purpose of cataloging and mapping he had retained Mädler's division of the Moon into four quadrants which were subdivided into 16 "grand divisions," each of 25° x 25° and designated from A to Q. These were further divided into "smaller spaces" measuring 5° x 5° and labelled with small Greek letters. Thus Tycho became III E sigma 2. During the six years of the committee's existence, Birt was able to publish maps of three "smaller spaces," on a scale of 200 inches to the Moon's diameter which were accompanied by a descriptive text of unbelievable unwieldiness: "From this cliff there are three divergent lines, one slightly west of south to IV A zeta 58; this (IV A alpha 49) forms the west foot of the cliff IV A zeta 38, IV A alpha 33, IV A alpha 14; one nearly due south, but slightly inclined to the east, this forms the summit of the cliff IV A zeta 38, which is furrowed by IV A zeta 81 ..." (10). The ultimate objective was that "of so registering an object that it might ever after, in all time, be sufficiently identified by all future observers" (11). An anonymous Fellow of the RAS, discussing maps of the Moon, commented: "The one projected by the British Association seems destined never to be completed. At present the only signs of it are afforded by four key-maps representing a minute portion of the Moon, drawn by Mr. Birt, which for absolute unintelligibility to the student surpass any delineation that we have seen" (12). Such sentiments must have been shared by the BAAS, for it withdrew its support and the committee was not re-appointed after 1870. In the meantime Birt had published his first monograph dealing with the Moon, "The Mare Serenitatis: its Craterology and Principal Features" (13). He probably knew in 1869 that support would be withdrawn, for we find him searching for other ways to

complete the map. Indeed the map and catalogue became an obsession which dominated the rest of his life. In 1869 an "Observing Astronomical Society" was formed (14) with the Rev. R. E. Hooppell serving as president, while Birt headed its Moon Section; there was also some talk of forming a "Selenographical Society" (15).

Largely because of the Linné affair, which had broken into the news during the third year of the committee's existence, the BAAS established a new lunar group, The Committee for Discussing Observations of Lunar Objects Suspected of Change, consisting of Rev. T. W. Webb, Edward Crossley, and Rev. Robert Harley. Again Birt was called upon to collect and reduce observations and he published two lengthy reports dealing with the spots, craterlets, and streaks on the floor of Plato (16). He was convinced that he had found evidence of activity (17), and it was Birt who originated the myth of the darkening of Plato's floor (18). In his summary statement he insisted on continued "extensive observations": "It will be some years before another series of observations of a particular region will be undertaken with the view of so closely examining the spots and streaks ... unless a staff of efficient observers be organized with the provision of a fund sufficiently ample to defray all the necessary expenses ... The staff should consist of not less than six devoted observers ... The observations should be forwarded ... to an experienced selenographer charged with the work of arranging and discussing them ... The requisite time cannot well be fixed at less than three years - five would most probably afford the best results." But apparently the BAAS had no interest in this scheme, for the committee was not again appointed after 1873. This time we have a statement by R. A. Proctor which may throw light on the reasons for the lack of continued interest: "What I have objected to is the mere collecting of observations without sustained purpose or study. Such work is utterly useless, and has never led to any new truth" (19).

Birt continued to look for support elsewhere. For example, in 1873 his mapping project was aided financially by 84 subscribers and donors (20). From 1872 to 1874 he served as president of the "Hackney Scientific Association" (later the "Metropolitan Scientific Association") and at its first meeting of 1874, he answered his critics with a tinge of bitterness: "From my almost isolated standpoint as a selenographist, I confess that the prospect is not one of the most encouraging. Great discoveries ... have been made during the last twenty years, but scientific literature is at present ... of a very light and gossiping character, in which facts are but little considered, and the imagination largely drawn on to catch the ear of the multitude. Those results which ... embody the research of a lifetime are but little read except by the earnest student." (21) To keep interest in his map alive, he published "A Catalogue of Lunar Objects" in 1872 (22), followed by "Selections from the Portfolios of the Editor of the Lunar Map and Catalogue" in 1873 and 1874, and "Contributions to Selenography" in 1974. The latter contained the fourth and last section of the map to appear, while both "Selections" and "Contributions" presented papers by other observers, among them T. W. Webb, E. Neison, H. Pratt, and J. W. Durrad. They were thus forerunners of the Selenographical Journal.

Birt had to discontinue his own observations in 1877, "owing to age and weakness," but he succeeded in that year in establishing a "Selenographical Club" with Rev. F. B. Allison as secretary, and a "Selenographical

Society" in 1878 with H. Sadler as secretary and E. Neison as editor of its Selenographical Journal. But while he had been instrumental in the organization of the latter society, and while he served as its president, his effective influence had ceased and Neison was mainly responsible for its success, short though it was. Both groups apparently existed side by side at least for a short time (23). Birt's final contribution to the study of the Moon came in 1880, when he wrote a series of articles entitled "Lessons in Selenography," with W. J. B. Richards (1835-1904) as co-author. This was the first systematic training course for lunar observers (24). At this time he presented to the RAS twelve manuscript volumes which contained the completed portions of the lunar map and catalogue. One year later he died at Leytonstone at the age of 77.

Undoubtedly Birt had stimulated interest in lunar observations, and the various observing groups he attempted to organize, particularly the "Selenographical Society," ultimately led to groups like the British Astronomical Association. He was the first to use lunar photography to determine selenographical positions for his maps, even though his methods were crude. His attempts to catalogue and systematize information about lunar surface details are distant forerunners of the work carried out by D. W. G. Arthur and his collaborators at the University of Arizona's Lunar and Planetary Laboratory. However, when one measures his direct contribution against that of his most distinguished contemporary in selenography, J. F. Julius Schmidt, it pales visibly. He lost himself in the labyrinth of minutiae, a selenographical Don Quixote in reverse, whose tragedy it was to have lived at the wrong time.

References: (1) Monthly Notices-RAS (MN) 42, 1882, 142-144, and Astronomical Register (AR) 20, 1882, 12-13. (2) Liverpool 1853, 2nd. ed. 1879, see "British Museum Catalogue of Printed Books," London 1937, vol. 19, 760-761. (3) MN 21, 1860-61, 174-176. (4) Report Brit. Assoc. (RB) 34, 1865, 303. (5) MN 22, 1861-62, 11. (6) RB 36, 1867, 259. (7) RB 37, 1868, 2. (8) RB 38, 1869, 1. (9) RB 35, 1866, 286. (10) RB 36, 1867, 251. (11) RB 37, 1868, 3. (12) English Mechanic 10, 1870, 249. (13) London 1869, 14 pp. and map, see AR 7, 1869, 256 and reference (2). (14) AR 7, 1869, 165. (15) AR 7, 1869, 256. (16) "Report on the discussion of observations of spots and streaks on the surface of the crater Plato," RB 41, 1872, 60-97, and 42, 1873, 245-301. (17) RB 41, 1872, 66. (18) RB 42, 1873, 245, and J. Ashbrook, "A Plato Illusion," Sky and Telescope 19, Dec. 1959, 92. (19) "Reply to Birt," AR 11, 1873, 257; see also Birt, "Condition of the Moon's surface," AR 11, 1873, 234-235/282-283, and "On the importance and necessity of continued systematic observation of the Moon's surface," ibid. 271-274. (20) AR 11, 1873, 123-124. (21) AR 12, 1874, 267-268. (22) London 1872, 4 pp., see reference (2). (23) AR 15, 1877, 302, and 19, 1881, 319. For the Selenographical Journal see J. Ashbrook, Sky and Telescope 17, Oct. 1958, 623/628. (24) AR 18, 1880, 70-71/94-95/117-119/146-148, and 19, 1881, 68-69/92-95/121-123/145-148/177-179/209-210/233-237/280-283/319/. - Birt's reports of the "Committee for Mapping the Surface of the Moon," totalling over 160 pages, are found in RB 35, 1866, 286-308; 36, 1867, 214-281 (with 2 map sections); 37, 1868, 1-24; 38, 1869, 1-45 (one map section); and 39, 1870, 76-81.

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The outline-maps of Plato and Cassini published here are on a scale of about 1:843,000, so that one inch = 13.29 miles. Cassini will be discussed in the next issue.