Mr. Slaffer
1351 California-Str. 11
San Francisco 94109
USA

Autor-Holzstich nach K. Jauslin
Mai 1998

The ground view is of a country village with the inhabitants thoroughly aroused, and every conceivable emotion is represented to the life. Where I was, the number of frightened ones was not nearly as large as in many other places, yet I knew some who hid themselves behind the curtains or under the bedclothes, when they were awakened, refusing to take a second glance. It was quite cold, but nothing could induce one of our company to even go into a house while a falling star was to be seen.

How long they continued to fall we had no possible means of determining. In the eastern part of Pennsylvania, where I was, they began to fall about eleven o'clock in the evening, increasing in frequency until, in a few hours, they became a perfect shower. They could no more be counted than one can count the fast falling flakes of snow in a hard storm. They continued to fall without any diminution of numbers until the dawn of day obscured them. And when the approaching light of the sun paled them in the east, they still covered the western sky. And when the spreading light obscured them in the every direction, occasionally one of great brilliancy would leave its trace in the west, showing that they were still falling.

While most of the incidents and scenes of my early years lose their interest and are seldom thought of, this increases in interest with the the increase of years. To nothing do I look back with greater delight, and I never think of it without feelings of thankfulness that i was permitted to behold it. Never have I spoken on the subject of the signs without having the Scripture representation of this sign inspire me with hope and courage. It has made the Saviour"s predictions a reality in my experience which, it seems to me, nothing but the memory of the sight could. Such a scene of glory I never expect to behold again until the heavens depart as a scroll, and

Jesus with his myriads of shining angels appears."

THE ARTIST AND THE ENGRAVER

Two signatures can be seen at the bottom right-hand corner of Fig. 1. It was common practice then, as it is now, for the artist to sign his paintings and for the engraver to sign his engravings. Karl Jauslin produced the original of Fig. 1. Jauslin was a Swiss painter and illustrator who was born on 21 May 1842 in Muttenz, Canton Baselland, and died on 13 October 1904 (see, for example, Carl Brun, Schweizerisches Künstler-Lexikon, Frauenfeld, Verlag von Huber & Co, 1908, vol II, p. 117). Jauslin first studied art both under Thommen and at the Basle Art School. But he received more detailed tuition in painting and engraving at the Stuttgart Art School between 1871 and 1875.

During the 1870-71 war Jauslin became the war artist for the newspapers *Ueber Land und Mer* and *Deutsche Kriegszeitung.* Typical of his epic works are the illustrations in books such as *Swiss History in Pictures* and *Pictures of Basle Family Life .* Jauslin's artistic style is not easily categorised but the word "patriotic" has been used. He concentrated on realism, having a style that followed doggedly in the footsteps of the Swiss painters of historical scenes who lived in the first half of the nineteenth century. When compared to his contemporaries his work was decidedly anachronistic.

The original of Fig. 1 was subsequently engraved by Adolf Völlmy. The initials X . A. that appear after Völlmy's signature on Fig 1 most probably stand for Xylographische Ausschnitt (or Atelier) - wood-block engraver (or worker). Adolf Völlmy was born in Liestal, Basle on 2 April 1864 (his parents being Carl Völlmy, a teacher of drawing , and Dorothea Pfaff). He set up his wood-engraving workshop at 29, Birsigstrasse, Basle in 1887. Völlmy produced a number of woodcuts that appeared in early Seventh-day Adventist publications (see for example *Historical Sketches of the Foreign Missions of the Seventh-day Adventists,* Imprimerie Polygotte, Basle, 1886). He died on 24 December 1914

The World's Most Famous Meteor Shower Picture

David W. Hughes

Department of Physics, The University, Sheffield S3 7RH

SUMMARY . The world's most famous meteor shower picture (Fig. 1) is of the storm that took place in the early morning of Wednesday, 13 November 1833. The picture was, however, produce 54 years after the event, being first published in April 1888. It had a biblical origin and was only taken over by the astronomers in the mid 1920s. The artist was the Swiss painter Karl Jauslin and the engraver was Adolf Völlmy.

INTRODUCTION

The engraving shown in Figure 1 is the most popular illustration of a meteor shower that is known. Astronomically it has, for example, appeared in Grondal (1926) where it was correctly labelled "Meteoric Shower of November 13,1833". This reproduction was enlivened by a quotation form the poet Bailey

"The stars from Heaven like rain-drops from a bough,
Like tears they poured adown creation's face."

It was also shown in Watson (1941, 1956), where the caption states incorrectly "according to a contemporary artist". Hawkins (1961), Knight (1969) and Sagan & Druyan (1985) used it too. Pejovic (1982) unfortunately labelled it "the crucially significant meteorite shower falling on L'Aigle, France in 1803."

The origin of the illustration was not astronomical at all, but religious. It first appeared in a weekly publication of the Seventh-day Adventists Church, (see Waggoner, 1888). The Adventist church stemmed from the preaching of a Low

Earth, Moon, and Planets **68**: 311-322, 1995.

Hampton farmer from eastern New York State called William Miller (see Rowe, 1976). In 1831 Miller announced that Jesus Christ would return to earth in a physical body in the year 1843. He would then judge sinners and inaugurate the millennium. Adventists watched the skies for the second coming of Christ and believed that the Apocalypse was imminent. They had a tendency to identify spectacular natural phenomena with the Biblical prophecies that related to the end of the world. The observations of the Leonid meteor storm of November 1833 fitted superbly with the opening of the "sixth seal".

THE ORIGINATOR, J. H. WAGGONER

Joseph Harvey Waggoner (1820 -1889) was a Seventh-day Adventist minister who had converted from the Baptists in 1852. After his ordination he had travelled extensively through the United States doing evangelistic work. In 1886 he was sent to Europe to aid in the establishment of his church (see *Seventh-day Adventist Encyclopedia*, Review and Herald Publishing Association, Washington, D. C., 1976, p. 1563).

Waggoner, who was living in Basel, Switzerland at the time of the conception of the illustration shown in Figure 1, actually saw the shower when he was a teenager. He wrote

> it appeared so grand and magnificent as to be truly exhilarating. It was a sight never to be forgotten. It stands as vividly printed on my memory to-day (i.e. in 1888) as it did a month after it occurred....It is not possible to give in a picture a representation of the stars falling at all points of the compass at once. But they fell in myriads to the north, east, south and west. Any representation on paper must at best give a very limited idea of the reality.

According to Waggoner the meteors

> presented exactly the appearance given in the description in the prophecy: "The stars of heaven *fell* unto the earth."

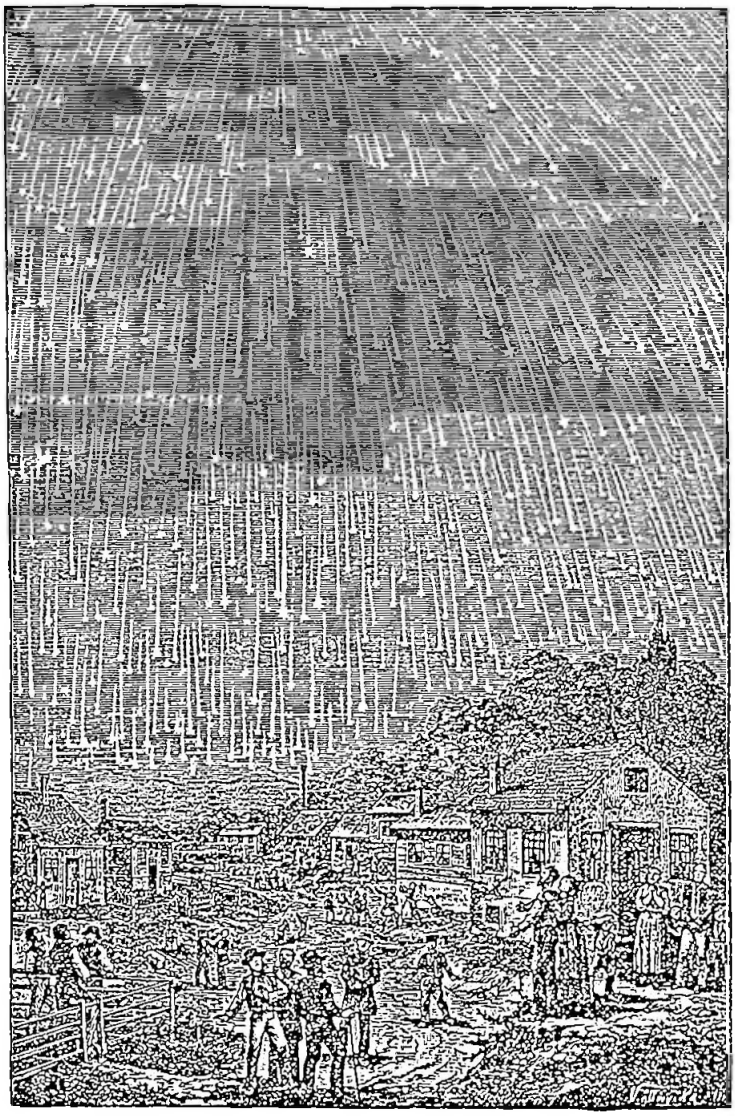


Figure 1. This, the world's most famous meteor picture, depicts the Leonid meteor storm that occurred in the early hours of Wednesday November 13, 1833. Joseph Harvey Waggoner was about 13 at the time. In about 1887 he described the scene to the swiss artist Karl Jauslin. A picture was painted and the subsequent engraving by Adoph Völlmy is shown above. This engraving was first published in April 1888, fifty-four years after the storm.

"The scene was truly awful for never did rain fall much thicker than the meteors fell towards the earth."

If we turn to The Bible, the Book of Revelations, Chapter 6 reads

> 12 And I beheld when he had opened the sixth seal, and, lo, there was a great earthquake; and the sun became black as sackcloth of hair, and the moon became as blood;
>
> 13 And the stars of heaven fell unto earth, even as a fig tree casteth her untimely figs, when she is shaken by a mighty wind.

Waggoners description and the illustration must be considered in the context of the gospel of St Matthew Chapter 24 verse 3. Jesus was asked by his disciples "what *shall be* the sign of thy coming, and of the end of the world ?" In Verse 29 Jesus says

> Immediately after the tribulation of those days shall the sun be darkened, and the moon shall not give her light, and the stars shall fall from heaven, and the powers of the heavens shall be shaken:

According to Waggoner some of the finest illustrations contained in the books published by the Seventh-day Adventist Church at that time (1888) were produced by a Mr Karl Jauslin, who lived a few miles from Basel in Switzerland. Waggoner went to see Jauslin to ask him to produce a realistic illustration of the "falling of the stars". Quoting again from *The Signs of theTimes,* Waggoner writes

> to him I referred this subject, giving him at some length a description of the scene. He had also the benefit of descriptions of the effect it produced on differently constituted minds. He has furnished a design (see Fig.1) which gives the best idea of the actual scene of all the representations that I ever saw. The falling stars cover the entire space shown, giving a slight curve to the outer ones to correspond to the concave appearance of the sky. If there is any fault in this picture in any particular, it is in this curve being too great, slight as it is. The point from which they emanated was far beyond our atmosphere, and of course so far beyond the range of vision, that in every locality they appeared to fall straight downward.

The ground view is of a country village with the inhabitants thoroughly aroused, and every conceivable emotion is represented to the life. Where I was, the number of frightened ones was not nearly as large as in many other places, yet I knew some who hid themselves behind the curtains or under the bedclothes, when they were awakened, refusing to take a second glance. It was quite cold, but nothing could induce one of our company to even go into a house while a falling star was to be seen.

How long they continued to fall we had no possible means of determining. In the eastern part of Pennsylvania, where I was, they began to fall about eleven o'clock in the evening, increasing in frequency until, in a few hours, they became a perfect shower. They could no more be counted than one can count the fast falling flakes of snow in a hard storm. They continued to fall without any diminution of numbers until the dawn of day obscured them. And when the approaching light of the sun paled them in the east, they still covered the western sky. And when the spreading light obscured them in the every direction, occasionally one of great brilliancy would leave its trace in the west, showing that they were still falling.

While most of the incidents and scenes of my early years lose their interest and are seldom thought of, this increases in interest with the the increase of years. To nothing do I look back with greater delight, and I never think of it without feelings of thankfulness that I was permitted to behold it. Never have I spoken on the subject of the signs without having the Scripture representation of this sign inspire me with hope and courage. It has made the Saviour"s predictions a reality in my experience which, it seems to me, nothing but the memory of the sight could. Such a scene of glory I never expect to behold again until the heavens depart as a scroll, and

Jesus with his myriads of shining angels appears."

THE ARTIST AND THE ENGRAVER

Two signatures can be seen at the bottom right-hand corner of Fig. 1. It was common practice then, as it is now, for the artist to sign his paintings and for the engraver to sign his engravings. Karl Jauslin produced the original of Fig. 1. Jauslin was a Swiss painter and illustrator who was born on 21 May 1842 in Muttenz, Canton Baselland, and died on 13 October 1904 (see, for example, Carl Brun, Schweizerisches Künstler-Lexikon, Frauenfeld, Verlag von Huber & Co, 1908, vol II, p. 117). Jauslin first studied art both under Thommen and at the Basle Art School. But he received more detailed tuition in painting and engraving at the Stuttgart Art School between 1871 and 1875.

During the 1870-71 war Jauslin became the war artist for the newspapers *Ueber Land und Mer* and *Deutsche Kriegszeitung.* Typical of his epic works are the illustrations in books such as *Swiss History in Pictures* and *Pictures of Basle Family Life .* Jauslin's artistic style is not easily categorised but the word "patriotic" has been used. He concentrated on realism, having a style that followed doggedly in the footsteps of the Swiss painters of historical scenes who lived in the first half of the nineteenth century. When compared to his contemporaries his work was decidedly anachronistic.

The original of Fig. 1 was subsequently engraved by Adolf Völlmy. The initials X . A. that appear after Völlmy's signature on Fig 1 most probably stand for Xylographische Ausschnitt (or Atelier) - wood-block engraver (or worker). Adolf Völlmy was born in Liestal, Basle on 2 April 1864 (his parents being Carl Völlmy, a teacher of drawing , and Dorothea Pfaff). He set up his wood-engraving workshop at 29, Birsigstrasse, Basle in 1887. Völlmy produced a number of woodcuts that appeared in early Seventh-day Adventist publications (see for example *Historical Sketches of the Foreign Missions of the Seventh-day Adventists,* Imprimerie Polygotte, Basle, 1886). He died on 24 December 1914

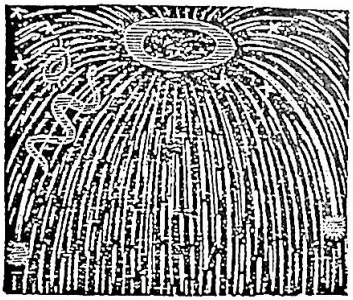
Jauslin had also been commissioned by the Seventh-day Adventists Church to produce a series of illustrations for a book they were publishing titled *Bible Readings for the Home Circle*. This comprised 162 readings for public and private study in which answers were given to over 2800 questions on religious topics, these having been contributed by more than a score of Bible students. The publishers were the Review and Herald Publishing Co of Battle Creek Mitchigan, Chicago Illinois and Toronto, Ontario. Our Fig 1 appeared in the 1889 edition of this book (see p. 66) and here it was titled "Meteoric Shower of Nov. 13. 1883. " Under the right hand corner of the illustration it said COPYRIGHTED 1888. The text referred to a statement by "the celebrated astronomer and meteorologist Prof Olmsted of Yale College", who said that

> Those who were so fortunate as to witness the exhibition of shooting stars on the morning of Nov. 13, 1833, probably saw the greatest display of celestial fire-works that has ever been since the creation fo the world, or at least within the annals covered by the pages of history.....The extent of the shower of 1833 was such as to cover no inconsiderable part of the earth's surface...This is no longer to be regarded as a terrestrial, but a celestial, phenomenon; and shooting stars are now to be no more viewed as casual productions of the upper regions of the atmosphere, but as *visitants from other worlds,* or other planetary voids.

DISCUSSION

The 13th of November 1833 was a Wednesday and some meteors had been seen before midnight on Tuesday the 12th.

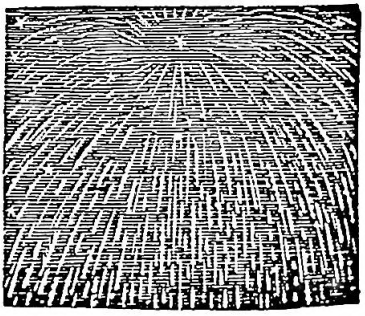
Two other illustrations of the1833 Leonids are shown in Figs 2 and 3. these have a great advantage over Fig. 1 in as much as they are contemporary and not drawn some 54 years after the event. Fig. 2 , which apart from showing a host of meteors also seems to depict a halo and a snake, originates from Mr Henry J.



Devens (1876, p330).

Figure 2. this engraving was executed under the direction of Henry J. Pickering, one of the editors of *The Old Countryman*. He witness the shower. the engraving was published in, for example, the November edition of the *Mechanics' Magazine* (New York, p 288)

> To form some idea of the phenomenon, the reader may imagine a constant succession of fire-balls, resembling sky rockets, radiating in all directions from a point in the zenith, and following the arch of the sky towards the horizon. They proceeded to various distances from the radiating point, leaving after them a vivid streak of light, and usually exploding before they disappeared. The balls were of various sizes and degrees of splendor: some were mere points, but others were larger and brighter than Jupiter or Venus, and one, seen by a credible witness, before the writer was called, was judged to be nearly as large as the Moon. The flashes of light, though less intense than lightning, were so bright as to waken people in their beds.



Denison Olmsted, *Mechanic's Magazine*, op cit p. 287.

Figure 3. Another representation of the November 1833 Leonids, taken from the *Mechanics' Magazine*, New York, November 1833, p. 288.

Pickering, one of the editors of *The Old Countryman*, a New York weekly journal "who witnessed the scene and under whose direction and instruction the prefixed representation was made." The woodcut appeared in *The Old Countryman*, of 20 November 1833 and was then reproduced in various newspapers and journals such as *Mechanics' Magazine*, (New York, Vol 2, p. 287, November 1833) and *The New York Journal of Commerce* (November 27, 1833 (see also *The Telescope*, October 1934, p. 80).

Olmsted (1833) commented on the fact that the radiant was in Leo and stayed at the same celestial position throughout the night (he estimated this position to be Right Ascension 150° , Declination 20°). As to the "snake" Olmsted wrote

> One ball that shot off in the north-west direction, and exploded near the star Capella, left, just behind the point of explosion, a phosphorescent train of peculiar beauty. This line was at first nearly straight, but it shortly began to contract in length, and dilate in breadth, and to assume the figure of a serpent folding itself up, until it appeared like a small luminous cloud of vapor This cloud was borne eastward by the wind, opposite to the direction in which the meteor had proceeded, remaining in sight several minutes. The light was usually white, but was occasionally prismatic, with a predominance of blue.

Many observers noted that the meteors "were like the ribs of a gigantic umbrella" The small piece in the *Mechanics' Magazine* stresses the fact that the shower was the subject of much public and scientific interest and the editor ends by writing

> We shall close our account of this extraordinary phenomena, by introducing another drawing, and soliciting the favor of communications of any of our friends and correspondents, tending to elucidate the subject.

This final drawing is shown as Fig. 3.

François Arago (1857) noted that 240,000 meteors were visible above the

Boston horizon in a period of seven hours. So Jauslin's picture (Fig. 1) has caught the attitude of the onlookers very well. To quote from Devens (1876)

> No celestial phenomenon has ever occurred in this country, since its first settlement, which was viewed with such intense admiration by one class in the community, or with so much dread and alarm by another. It was the all-engrossing theme of conversation and of scientific disquisition, for weeks and months. Indeed, it could not be otherwise, than that such a rare phenomenon, — next in grandeur and sublimity to that of a total solar eclipse, or a great comet stretched athwart the starry heavens, in full view of a wonder-struck universe, — should awaken the deepest interest among all beholding it. Nor is the memory of this marvellous scene yet extinct; its sublimity and awful beauty still linger in many minds, who also remember well the terror with which the demonstration was regarded, and the mortal fear excited among the ignorant that the end of the world had come. During the three hours of its continuance, the day of judgment was believed to be only waiting for sunrise, and, long after the shower had ceased, the morbid and superstitious still were impressed with the idea that the final day was at least only a week ahead. Impromptu meetings for prayer were held in many places, and many other scenes of religious devotion, or terror, or abandonment of worldly affairs, transpired, under the influence of fear occasioned by so sudden and awful a display.

So Fig. 1, a figure that has graced astronomy books for the last half century, owes its origin to the apocalyptic fears of an Adventist minister who had maintained fresh in his memory the awesome sight of the Leonid storm of November 1833, that he had seen when he was thirteen years old.

I do not know why, around 1926, the Leonid picture was rescued from relative biblical obscurity by Mrs Florence Armstrong Grondal, we can only be thankful that it was.

Florence Armstrong was born on October 8, 1899 in New York and moved to Seattle during her childhood. There she attended Broadway High School and the University of Washington (where she read evolution, zoology and astronomy). She married Bror Leonard Grondal in April 1912 and he later became the professor of forestry at that University.

Only two books by Mrs Grondal are listed in The National Union Catalog Pre-1956 Imprints, these being The Music of the Spheres (1926) - the one with the picture -, and Stars, Their Facts and Legends : A first star book for children, (1940) Garden City Publishing Co., New York. The former took her eight years to write and illustrate (see Sunset Magazine, December 1927, p. 47). It received a friendly reception from the non-astronomical but was given a rather critical appraisal by, for example, Frank Schlesinger of the Yale University Observatory (Science, 64, July 23, 1926). Mrs Grondal was a prolific writer of short articles for periodicals.

Nothing has been found to indicate that she was a Seventh-day Adventist, in fact her husband was a Swedish Lutheran. She was, however, the assistant director of the Western Washington branch of the American Meteor Society and one of the founder members of the Seattle Amateur Astronomy Society (see for example Who's Who of American Women, Marquis, New York, and Who was Who among North American Authors, 1921 - 1939, Gale Research Co., Detroit, Michigan.

ACKNOWLEDGEMENTS

I would like to thank Gary W. Shearer, the Special Collections librarian, Pacific Union College, Angwin, California, Uli W. Steinlin of the Astronomisches Institut der Universität Basel M. Barlow Pepin, the Editor of *The Reflector* and Ruth S. Freitag of the Science and Technology Division, Library of Congress, Washington, for their most helpful contributions.

REFERENCES

Arago, F., 1857, *Astronomie Populaire*, Gide, Paris, vol IV, p. 310.

Devens, R. M., 1876. *Out First Century; being a Popular Descriptive Portraiture of the one Hundred Great and Memorable Events of Perpetual Interest in the History of our Country*, C. A. Nicols & Co, Springfield, Mass, p. 329.

Grondal, Florence A., 1926. The Music of the Spheres, Macmillan Co., New York, p. 243. (In 1942 this book was published, again by Macmillan, under the title of *The Romance of Astronomy*).

Hawkins, Gerald S., 1961, *Splendor in the Sky*, Harper and Brothers, New York, p. 221.

Knight, David C., 1969, *Meteors and Meteorites*, Franklin Watts, New York, p. 27.

Olmsted, Denison, 1833, *Mechanics' Magazine*, vol 2, 287.

Pejovic, Brian, 1982, *Man and Meteorites*, Thames Head, p. 8.

Rowe, David L., 1976, *Adventist Heritage*, vol 3 p. 10.

Sagan, Carl & Druyan, Ann, 1986. *Comet*, Random House, New York, p. 226.

Waggoner, J. H., 1888, *The Signs of the Times*, 14, 232, (April 13).

Watson, Fletcher G., 1941 (1st ed.), 1956 (2nd ed.). *Between the Planets*, Harvard University Press, plate 25.

Dr. Hildegard Gantner-Schlee
Im Brüggli 3
CH-4132 Muttenz

Muttenz, 5. 10. 1996

Mr. David W. Hughes
Dept. of Physics
University of Sheffield
GB-Sheffield S3 7RH

Dear Mr. Hughs

Only some weeks ago a reader of the journal "Sky & Telescope" let me read the articles concerning the woodcut showing the "Meteoric Shower of Nov. 13, 1833" - published in 1986-1988.

Maybe you are still interested to get to know something about Karl Jauslin (1842-1904) and to know that "A. Völlmy XA" stands for "Adolf Völlmy Xylographische Anstalt".

Adolf Völlmy run his Xylographische Anstalt at the end of the last century (about 1880-1900) in Liestal, which is the capital of the Kanton Basel-Landschaft. To find out the exact dates of his life and of his business would take some time - but I think you are not interested in further informations.

With best wishes yours sincerely

Department of Physics
The Hicks Building, Sheffield S3 7RH
Fax: +44 (0)114 272 8079
Telex: 547216 UGSHEF G

Phone 0114 282 4288
Fax 0114 272 8079

The University of Sheffield

14 October, 1996.

Dr Hildegard Gantner-Schlee,
Muttenz.

Dear Dr Gantner-Schlee,

Karl Jauslin

What a lovely surprise for a Monday morning. Many many thanks for sending me your fascinating book on Jauslin. I will enjoy reading it greatly. I love the self portrait on page 4. When I lecture about the picture again I will recommend your book.

As to my article in *Sky and Telescope*, I have moved a touch further. Just over two years ago we had a conference in Bratislava on Meteoroids and I wrote a short paper for that conference on the Leonid picture. I am enclosing this paper with this letter.

All the best,

David W. Hughes

Dr David W. Hughes
The Reader in Astronomy

A Mysterious Woodcut

David W. Hughes, University of Sheffield, England

RECORDED HISTORY'S most prodigious meteor shower, a spectacular Leonid display, is portrayed in the popular wood engraving *Meteoric Shower of Nov. 13, 1833*. It depicts hundreds of shooting stars pouring from the heavens and causing astonishment among a crowd of onlookers. The illustration has appeared in a variety of books, but where did it originate?

My letter (*S&T:* August, 1986, issue, page 108) elicited some response. I was hoping to find that the artist had not only witnessed the event, but had written an account of the dramatic details as well. This seems not to be the case.

A century ago, illustrations in books and periodicals were sometimes engraved copies of paintings or photographs. However, *Meteoric Shower* has the signatures of both an engraver and an artist. One signature is ambiguous — could it be "Völlmy, X. A."? Most of my friends in the world of art history support my suspicion that this, the more prominent signature, is that of the artist.

I have not yet found a "Völlmy" in my research of artists working in the mid-19th century. Paul Aimé Vallouy was a Swiss painter of still lifes, landscapes, and conversation pieces; he lived from 1832 to 1899. And Fritz Voellmy, also Swiss, was born in 1863. No one else from "Vall . . ." to "Vull . . ." seems to fit the bill.

"K. Jauslin," on the other hand, made sure his name was clear. Karl Jauslin was a Swiss painter and illustrator who was born in Muttenz on May 21, 1842; he died on October 13, 1904. As a competent artist and book illustrator, he would have been perfectly capable of doing either the original artwork or the woodcut.

A series of engravings, including this one, appear with Jauslin's name in *Bible Readings for the Home Circle,* published in 1889 by Review and Herald Publishing Company of Battle Creek, Michigan. That book, which addresses over 2,800 questions on religious topics, uses the Leonid shower woodcut as an illustration of Old Testament prophecies fulfilled. So, far from starting life as a figure in some astronomical text, *Meteoric Shower of Nov. 13, 1833,* appears to have first proclaimed a biblical message!

Top: Apparently, the *Meteoric Shower of Nov. 13, 1833,* woodcut was originally published in *Bible Readings for the Home Circle,* Review and Herald Publishing Company, 1889. *Bottom:* An enlargement of the two signatures that appear on the Leonid shower engraving. "K. Jauslin" was probably the engraver. The artist may be "Völlmy, X. A.," but who was he, and did he witness the event?

Indeed, the Leonids on that cloudless night were thought by many to be a divine sign. In *Our First Century,* by R. M. Devens, the 1833 Leonid shower was listed among the 100 great and memorable events in American history. Devens writes:

> During the three hours of its continuance, the day of judgment was believed to be only waiting for sunrise, and, long after the shower had ceased, the morbid and superstitious still were impressed with the idea that the final day was at least only a week ahead. Impromptu meetings for prayer were held in many places, and many other scenes of religious devotion, or terror, or abandonment of worldly affairs, transpired, under the influence of fear occasioned by so sudden and awful a display.

Reference was made by some to *Matthew 24:29:* "Immediately after the tribulation of those days shall the sun be darkened, and the moon shall not give her light, and the stars shall fall from heaven, and the powers of the heavens shall be shaken"; *Revelation 6:12-13:* "And I beheld when he had opened the sixth seal, and, lo, there was a great earthquake; and the sun became black as sackcloth of hair, and the moon became as blood; And the stars of heaven fell unto the earth, even as a fig tree casteth her untimely figs, when she is shaken of a mighty wind"; and *Isaiah 34:4* " . . . and the heavens shall be rolled together as a scroll: and all their host shall fall down."

In time, other illustrations of that famous meteor display appeared in various publications, some signed by unknown artists, others unsigned and with no credit line. But *Meteoric Shower of Nov. 13, 1833,* remains the most famous image of the scene. It was engraved more than 50 years after the event by someone who, it appears, wasn't yet born when the shower occurred. Apparently its debut was in a religious text to illustrate a biblical message. And we still do not know clearly the name of the artist.

I would like to give special thanks to Paul Annala, R. E. Blocker, Ruth S. Freitag, and David M. Ludlum for their helpful correspondence.

Hughes is a senior lecturer in astronomy and physics at the University of Sheffield.

SKY & TELESCOPE

Editor: Leif J. Robinson
Managing Editor: William E. Shawcross
Senior Editor: J. Kelly Beatty
Technical Editor: Ronald A. Schorn, Ph.D.
Associate Editors: Dennis di Cicco, Roger W. Sinnott, David H. Smith, D.Phil.
Assistant Editors: Mollie D. Boring, Stephen James O'Meara
Advertising: Lester J. Stockman
Marketing: William R. Lawrence
Sky Books: Alan M. MacRobert, *director*, Alan Hirshfeld, Ph.D.
Production: William H. Bonney, *manager*
Art Direction: Nan Rabinowitz
Design: Martha Lynch
Graphic Arts: Ron Arruda, Charles T. Baker
Illustration: Steven Simpson
Photography: Dennis Milon
Proofreading: Daniel McGinley
Typesetting: Clyde R. Cross
Fulfillment: Virginia K. Brewer, *director*
Subscriptions: Sarah E. Bulger, *manager*, Theresa Downing, Anna Vergona
Other Sky Publications: Ellen M. Betz, Cheryl Simmons
Accountant: Julius A. Visconti
Business Manager: John J. Simmons, Jr.
Shipping: Lawrence Babin

SKY & TELESCOPE (ISSN 0037-6604) is published monthly by Sky Publishing Corporation, 49 Bay State Rd., Cambridge, Mass. 02238-1290. Telephone: 617-864-7360.

Second-class postage paid at Boston, Mass., and at additional mailing offices. POSTMASTER: Send address changes to Sky & Telescope, 49 Bay State Rd., Cambridge, Mass. 02238-1290.

SUBSCRIPTION: $20.00 per year in the United States and possessions; $37.00 for two years; $54.00 for three years. See the coupon facing the inside back cover for more information and foreign rates. Single copy of current volume, $2.00; foreign, $3.00. Back issues available from 1975, $3.00; foreign, $4.00. Order from address above. *Microform editions* from 1941 and xerographic copies: University Microfilms, 300 N. Zeeb Rd., Ann Arbor, Mich. 48106. Microform editions also from Bell & Howell, Wooster, Ohio 44691; Information Access Co., 404 Sixth Ave., Menlo Park, Calif. 94025; and NCR Source Document Services, 3100 Valleywood Dr., Dayton, Ohio 45429.

ADVERTISING: Rates are sent on request and are listed in *Standard Rate and Data Service.*

EDITORIAL: Send all correspondence and manuscripts to our Cambridge offices. Reader contributions welcome — write for author's guide.

CITATIONS: Articles are indexed in *Astronomy and Astrophysics Abstracts, Astronomy and Astrophysics Monthly Index, Book Review Index, IBR, IBZ, Monthly Periodical Index, The Magazine Index, Physics Abstracts, The Readers' Guide to Periodical Literature.*

LETTERS

Pele's Atmospheric Creations

The alternating light and dark bands passing through a patch of light seen above the erupting cone Pu'u O'o on the island of Hawaii (page 89 of the January issue) were most likely caused by shock waves generated by the volcano. These waves would have disturbed the ice crystals in the cloud above the volcano, particularly those whose horizontal faces reflected the light of the lava fountain.

Such optical effects of sound waves are not unknown in halo phenomena. If this explanation applies, the apparent speed of the moving bands observed by Nelson and Albrecht should have been approximately 3° per second.

G. H. ARCHENHOLD
70 Longworth Rd.
Horwich, Bolton BL6 7BE
England

Easter Dates

In Astronomical Computing for March, Roger Sinnott quotes Martin Gardner and others as stating that April 19th is the most common date of Easter. Indeed, in the grand cycle of 5,700,000 years, Easter occurs most frequently on April 19th — precisely 220,400 times. The rarest occurrence is March 22nd, which turns up only 27,550 times. In fact, as many as 1,887 years can elapse before the latter date repeats, the longest wait for any Easter.

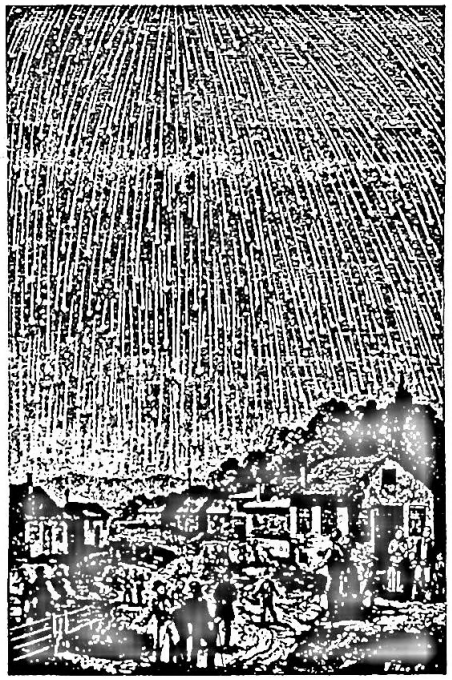
On the average, we have to wait only 11 years until Easter falls on the same date again, though there is a minimum interval of 5 years. On the other hand, there is a minimum wait of 57 years between Easters on April 25th, its latest possible date.

The 5,700,000 years that encompass a complete pattern of Easter dates is by far the longest chronological cycle in our calendar. This enormous period is due to the way Luigi Lilio (*S&T*, November, 1982, page 418) and the commission under Pope Gregory XIII organized the table of epacts. This arrangement of 30 numbers denotes the approximate age of the Moon on January 1st, by which the Paschal (Easter) Full Moon can be established.

In that table, the epacts are referenced against a row of numbers from 1 to 19, called Golden Numbers. The Golden Number fixes any given year within the 19-year lunar or Metonic cycle. Since the so-called solar and lunar corrections — which keep Easter in tolerable agreement with the mean Sun and Moon — are applied only in century years (those evenly divisible by 100), all the epacts repeat after 100 centuries or 10,000 years. Consequently, the number of years in a complete cycle of Easter dates is the multiple of 19, 30, and 10,000; that is, 5,700,000.

A convenient table listing the frequencies of all 35 possible dates of Easter and the intervals at which they reoccur appears in George W. Walker's exhaustive article "Easter Intervals," published in the now-defunct *Popular Astronomy,* Vol. 53, pages 162-179 and 218-232, 1945.

GORDON MOYER
Rittenhouse Astronomical Society
P. O. Box 12-531
Philadelphia, Pa. 19151



Leonid Mystery

Does anyone have information on where the accompanying woodcut was originally published? I believe it is of the Leonid shower, and I am trying to locate the text that goes with it.

DAVID W. HUGHES
Dept. of Physics
University of Sheffield
Sheffield S3 7RH, England

LETTERS

examined the night before with your article as a guide. I was pleasantly surprised to remember it well enough to get all the way through it before looking at the chart. This small piece of sky will always have a special place in my astronomical memories, like my first look through a telescope or my first view of a resolved star cluster.

RAY CHUVALA
R.F.D. 5, Box 242-1
Fayetteville, Tenn. 37334

Teeny-Tiny Energies

In a box entitled "Big Little Energies" in his article on cosmic rays (March issue, page 265), David Helfand defined the electron volt and called it "a very small quantity."

When teaching nutrition, I often emphasize that although physical units vary in size and are peculiar to each field of science, they are interchangeable. For example, the familiar Calorie in the field of nutrition is the amount of energy required to heat one kilogram of pure water from 14.5 to 15.5° Celsius at standard atmospheric pressure. It equals 2.61×10^{22} electron volts.

The electron volt is indeed a very small quantity!

LESLIE M. KLEVAY
223 27th Ave. S.
Grand Forks, N. D. 58201

A National Observatory of a Different Kind

While scientists lament cuts in federal spending for astronomical research (May issue, page 469), we must remember that when money is scarce, practical research always seems to take precedence over "pure" science.

But have no fear that all celestial research will grind to a halt. There is a rumor, as yet unsubstantiated, that the Reagan administration plans to spend at least $15 million to establish a National Astrological Observatory before it leaves office in January. The chief instrument will be the Ronald Wilson Reagan Great Mural Quadrant. It will feature a portrait of the former president pointing toward the zodiac.

LELAND A. DOLAN
1601 S. Shepherd, #213
Houston, Tex. 77019

Vega as the Pole Star

Notwithstanding Sherman Schultz's trials with a planetarium projector (July issue, page 15), Vega gets much closer to the north celestial pole than the 12° he estimated. Vega is 28°.3 from the north ecliptic pole. Using this value one can calculate that sometime around 13,000 years ago it lay less than 5° from the celestial pole.

CHARLES KLUEPFEL
11 George St.
Bloomfield, N. J. 07003

More Pieces of the Leonid Woodcut Puzzle

My article on the mysterious 1833 Leonid meteor shower woodcut generated a flood of correspondence from readers (*S&T:* September, 1987, page 252, and April, 1988, page 349). One letter, however, really hit the nail on the head. M. Barlow Pepin, an amateur astronomer who holds a degree in printmaking, makes the following points about the two signatures on the woodcut.

In graphic (print) art, it is common for the first initial to precede the surname in a signature. So "K. [Karl] Jauslin" probably did the original art for the woodcut. It is also common for the engraver of the wooden block or metal plate, from which the final work is produced, to indicate the technique used. The letters "XA" that follow Völlmy's signature therefore probably stand for "Xylographische Ausschnit," or a variant, which loosely translates as "wood engraver." If Völlmy etched the block, this would explain the somewhat forced and mannered appearance of Jauslin's name. It would also justify the free way in which Völlmy cut his own signature. Fritz Völlmy became a recognized artist in his own right later on.

DAVID W. HUGHES
University of Sheffield
Department of Physics
Sheffield S3 7RH, England

An enlargement of the two signatures that appear at the bottom of the popular wood engraving *Meteoric Shower of Nov. 13, 1833*. M. Barlow Pepin of Lake Helen, Florida, believes that Karl Jauslin created the original art for the wood engraving and that Fritz Völlmy did the engraving.

If You're a Poet and You Know It

For the past 2½ years I have ended the newsletter of the Oceanside Photo and Telescope Astronomical Society with poetry related to astronomy. It has become a tradition. But, alas, my sources have now run dry.

So here's a chance for all you closet astro-poets to get published! Please dust off those poems stuffed in your desk and send them to me. I know we are not *The New Yorker,* but you have to start somewhere. I will be happy to send you a copy of the newsletter in which your poem appears. Thanks!

PENNY HAUCK
929 Buena Rosa Ct.
Fallbrook, Calif. 92028

Comet-Tally Blues

To compare William Bradfield's tally of 13 visual comet discoveries to Carolyn and Eugene Shoemaker's 13 finds on photographic plates (July issue, page 14) is to commit a sin by omission of fact. How you can mention traditional sweat-and-blood comet sweeping in the same breath as this technically advanced effort is beyond me. Anyone riding a motorcycle can outdistance a champion runner; this does not lessen the accomplishment of the athlete's 4-minute mile.

M. BARLOW PEPIN
P. O. Box 295
Lake Helen, Fla. 32744

Tailoring a High-Lite

I was pleased to see a review of the High-Lite binocular support (July issue, page 38). I have been using one for about two years and have had excellent results.

I have made a few alterations that improved its usability. I slightly bent the tabs above the chest pad where the straps attach to make the unit fit my chest more snugly. And, when I put the unit on, I clip the "belly strap" over the bottom of the chest pad; this improves side-to-side stability and slightly raises my 11 x 80 binoculars to eye level. These adjustments have made the device much more sturdy and have allowed me countless hours of comfortable sky scanning.

GEORGE HANNIGAN
3011 Edwin Ave., Apt. 2J
Fort Lee, N. J. 07024

LETTERS

Lost Moons of Saturn?

I wish to draw your attention to some historical curiosities, one of which seems to have been overlooked for more than a century. The April 27, 1861, *Atheneum* reported that Hermann Goldschmidt — a German-born astronomer who found 14 asteroids from Paris — discovered a new satellite of Saturn between the orbits of Hyperion and Iapetus. He suggested it be named Chiron. But Goldschmidt's observations went unconfirmed, and ultimately the object was lost.

By a strange coincidence — just the kind that makes the history of astronomy so fascinating — Charles T. Kowal discovered a Saturn-crossing minor planet at Palomar in 1977 and named it Chiron. But the two Chirons, in all probability, are not the same. On rare occasions, asteroid Chiron passes within 8 million miles of Saturn — not much farther than the distance of Phoebe — while both Hyperion and Iapetus are less than 2½ million miles distant.

Curiously, William Pickering also "discovered" a Saturnian moon, Themis, around the turn of the century. It supposedly moved in a highly inclined orbit just inside Hyperion's. The evidence for its existence came from 13 photographic plates taken with the 24-inch Bruce telescope at Arequipa, Peru — the same plates Pickering used to discover Phoebe. But Themis, like Goldschmidt's Chiron, promptly disappeared.

A. MACLEAN
22 Holly Bush Lane
Amblecote, Stourbridge
West Midlands, England

Meteoric Mysteries

David Hughes probably succeeded more than he thought in his search for the artist of the 1833 Leonid meteor shower woodcut (September issue, page 252). Hughes writes that he couldn't locate an artist named Völlmy, but he does report a Fritz Voellmy, born in Switzerland in 1863.

In fact, "ö" and "oe" are virtually identical in German (and Swiss German). They are freely substituted one for the other. In older German texts, the superscript "¨" is often given as a tiny "e." It is therefore very likely that Fritz Völlmy was in fact the artist of the woodcut.

The mystery does not end here, though. It's not at all clear to me why two Swiss artists, Karl Jauslin and Fritz Völlmy, would illustrate a book printed in Battle Creek, Michigan, in 1889. I bet the Michigan publication was preceded by a Swiss work.

Other riddles involve the letters "XA" following Völlmy's name on the woodcut, and the indistinct letters or numbers following Jauslin's name.

JOHN S. KEBABIAN
Washington Mountain Rd.
Becket, Mass. 01223

Völlmy: An *Amateur* Artist?

David Hughes writes that he has yet to find a "Völlmy" in his research of artists working in the mid-19th century. But is it mandatory to hunt for a professional? The famous Leonid woodcut could be the work of an unrecognized but gifted amateur.

Consider this example. In 1939 a Swiss editor published *Fünfstellige Logarithmen und Zahlentafeln,* a compilation of logarithms and other mathematical tables for use in schools. The volume's frontispiece bears a woodcut portraying our compatriot Jost Bürgi — astronomer, clockmaker, and co-inventor of logarithms. The woodcutter was no other than the editor himself, who, as far as I know, isn't listed anywhere as an artist. And what is his name? Erwin Voellmy!

PAUL WIRZ
Saelistrasse 20
CH-6005 Lucerne
Switzerland

Before *Uranometria 2000.0*

I was interested to learn in the introduction to *Uranometria 2000.0* that the work was inspired by *Webbs Atlas of the Stars,* prepared by H. B. Webb of the AAVSO. The introduction also suggests that Webb made his atlas by tracing the *Beyer-Graff Stern Atlas 1855.0,* updating the coordinate grids to equinox 1920.0 and using different chart divisions to accommodate a book format.

As the introduction also notes, because both of the older atlases plotted stars to about magnitude 9 on large-scale charts, they were especially useful to observers hunting faint deep-sky objects. As early as 1949 I made finder charts for my Deep-Sky Wonders column in this magazine from sections of the Beyer-Graff atlas. I mailed copies of the appropriate charts to

SKY & TELESCOPE

Editor: Leif J. Robinson
Senior Editor: J. Kelly Beatty
Technical Editor: Ronald A. Schorn, Ph.D.
Associate Editors: Dennis di Cicco, Alan M. MacRobert, Roger W. Sinnott, David H. Smith, D.Phil.
Assistant Editors: Mollie D. Boring, Richard Tresch Fienberg, Ph.D., Stuart J. Goldman, Stephen James O'Meara
Publisher: William E. Shawcross
Advertising: Lester J. Stockman
Marketing: William R. Lawrence
Consultant: Alan Hirshfeld, Ph.D.
Production: William H. Bonney, *manager*
Design: Martha Myers
Design coordination: Susan W. Gilday
Graphic arts: Ron Arruda, Charles T. Baker
Illustration: Steven Simpson
Photography: Dennis Milon
Proofreading: Carla M. Thompson
Typesetting: Margy MacRobert
Fulfillment: Virginia K. Brewer, *director*
Subscriptions: Sarah E. Bulger, *manager*, Theresa Downing, Anna Vergona
Other Sky Publications: Ellen M. Betz, Cheryl Simmons
Accountant: Julius A. Visconti
Business Manager: John J. Simmons, Jr.
Shipping: Lawrence Babin, Raymond Marshall

SKY & TELESCOPE (ISSN 0037-6604) is published monthly by Sky Publishing Corporation, 49 Bay State Rd., Cambridge, Mass. 02138. Telephone: 617-864-7360. All rights reserved. Second-class postage paid at Boston, Mass., and at additional mailing offices. POSTMASTER: Send address changes to Sky & Telescope, P. O. Box 9111, Belmont, Mass. 02178-9111.

SUBSCRIPTION: $21.95 per year in the United States and possessions; $40.95 for two years; $59.95 for three years. See the coupon at the back of this issue for more information and foreign rates. Single copy of current volume, $2.50; foreign, $3.50. Back issues available from 1980, $3.00; foreign, $4.00. Order from Belmont address. *Microform editions* from 1941 and xerographic copies: University Microfilms, 300 N. Zeeb Rd., Ann Arbor, Mich. 48106. Microform editions are also available from Information Access Co., 404 Sixth Ave., Menlo Park, Calif. 94025.

ADVERTISING: Rates are sent on request and are listed in *Standard Rate and Data Service.*

EDITORIAL: Send all correspondence and manuscripts to our Belmont address. Reader contributions welcome — write for author's guide.

CITATIONS: Articles are indexed in *Astronomy and Astrophysics Abstracts, Astronomy and Astrophysics Monthly Index, Book Review Index, IBR, IBZ, The Magazine Index, Monthly Periodical Index, Physics Abstracts, The Readers' Guide to Periodical Literature.*