

MICROCITATIONS. AN ANNOTATED COLLECTION OF MICROSCOPIC FOOTNOTES

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Many things have been said about the microscope, microscope findings, and even about microscopists during the last four centuries; some are informative, some are odd, most of them are amusing. Here is a random sample.

I. News from Rochester, NY.

“In spite of sweltering summer heat, the soiree held during the 1884 annual meeting in Rochester attracted 124 exhibitors and thousands of attendees. Among the Guests was the Rev. W. H. Dallinger, President of the Royal Microscopical Society. The macabre was represented by a section of the kidney of Charles Guiteau, the assassin of President Garfield.” Budd J. LaRue (1992) The Microscopical Soiree of 1884. Rittenhouse Journal of the American Scientific Instruments Enterprise, 6:52-56.

- **Sweltering heat in Rochester? That is news in its own right.**
- **The Reverend Dallinger was known for his dedication to microscopy, but equally as an active and successful Methodist preacher involved with religion as much as with science.**
- **Guiteau was hung for his crime on 30 June, 1882. Most likely he was insane; what made his kidney of interest to microscopists is unknown to us.**

The wounded President is in the foreground, while Guiteau is being apprehended in the background.

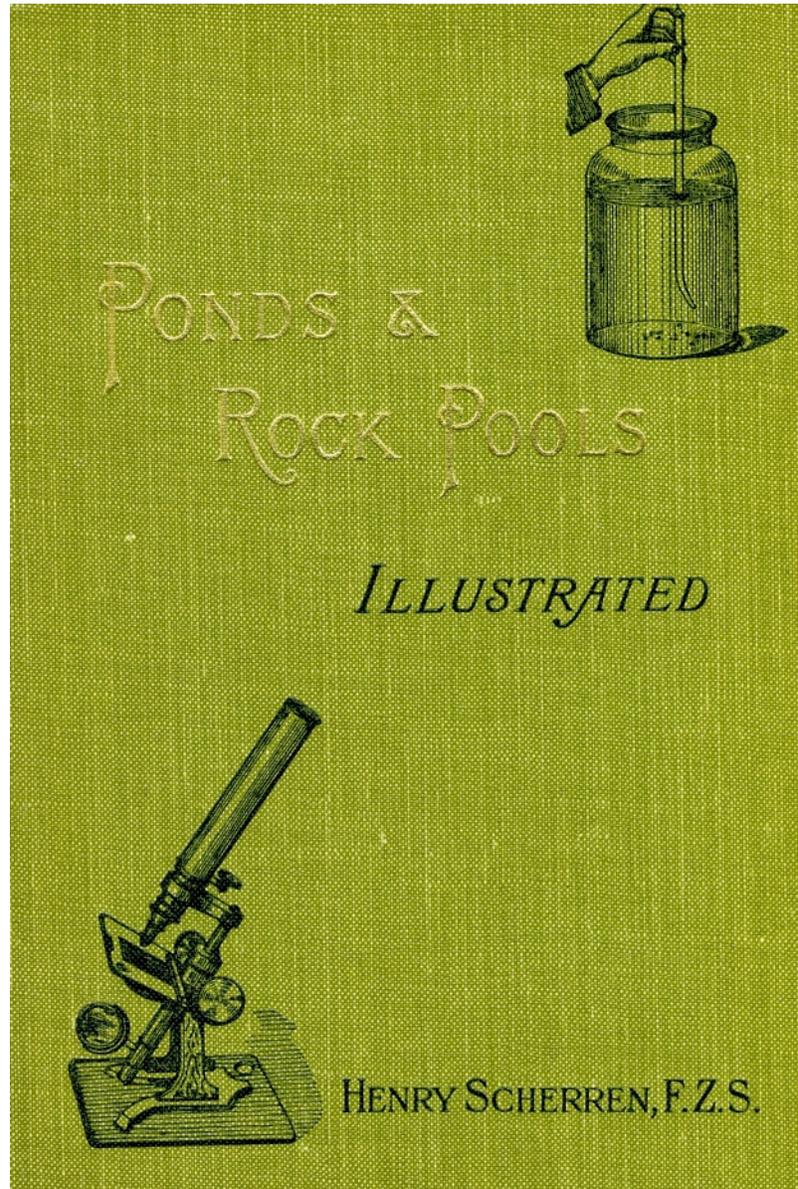


2. The sea at your doorsteps.

“If the water brought from the collecting excursions be not enough to fill the aquarium, and leave some over the smaller vessels into which rare objects may be put for frequent examination, in London at least there need be no difficulty about supply. The Great Eastern Railway Company will deliver three gallons for sixpence, within reasonable distance of any of their stations.”

Henry Scherren, F.Z.S.
(1900) *Ponds and Rock Pools with Hints on Collecting for and Management of the Micro-Aquarium*, First Edition, Second Impression, London.

Truly remarkable! The microscopists of London were pampered indeed, and this was the year 1900.



3. The joys of microscopy.

“In performing these researches so many marvels of Nature were spread before my eyes that I experienced an internal pleasure that my pen could not describe.” Marcello Malpighi (1628-1694), commenting on his microscopic work.

Malpighi (picture to the right) had indeed seen many marvels through his 1600's compound microscope. Regarded as the first histologist, his name is still associated with structures in the skin (Malpighi layer=*stratum germinativum*+*stratum spinosum* or *stratum basale*) the kidney, (Malpighi's corpuscles=*renal corpuscles*), the spleen (Malpighi's corpuscles=*splenic corpuscles*, *splenic nodules*, *white pulp*). He discovered the capillary vessels connecting arteries with veins. His studies of the fertilized chick egg provided the basis for modern embryology. He also made fundamental observations on the structure of insect and plant anatomy. Indeed, he saw “many marvels of Nature”



through the lenses of his microscopes. All of us who enjoy the beauty of the microscopic image can share his feelings. Malpighi was highly regarded in his own times. He was private physician to the Pope Innocent XII and a foreign member of the Royal Society of London, publishing many of his observations in the Society's Proceedings.

His work deserved this comment: “It may be said of Malpighi that he found paths crooked and left straight, he found darkness and he left light.” (Sir Michael Foster, Cambridge, 1901)

4. The accomplished Mr. Pillischer and the kind Mr. Hogg.



Mr. Moritz Pillischer, FRMS, of 88 New Bond Street W. and of 398 Oxford St, London, was a Hungarian-born designer and maker of microscopes and other scientific instruments in the middle 1800s. His microscopes such as the one shown to the left, are sought after by modern day collectors.

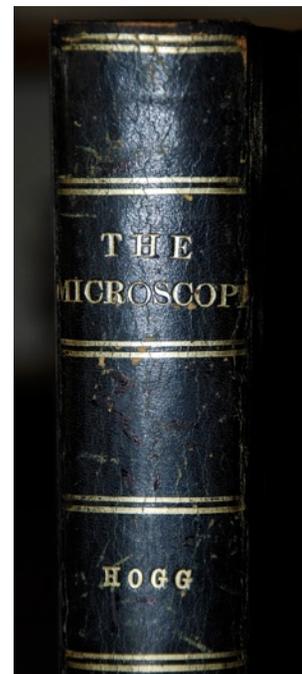
Mr. Jabez Hogg, was the author of the tremendously popular book, *The Microscope: its History, Construction, and Application, being a Familiar Introduction to the Use of the Instrument and the Study of Microscopical Science.*

Mr. Pillischer and Mr. Hogg were contemporaries. In his book Hogg reviewed Pillischer microscopes as well as those of other contemporary makers. These comments were culled from three

editions of his book (4th, 1859; 6th, 1867; 10th, 1883).

“Mr. Pillischer (New Bond Street) is favorably known for the excellency of his instruments.” - “[Pillischer’s No. 1, binocular microscope] ... no instrument can be better adapted than this to all ordinary wants of the pathologist or skilled microscopist.” - “[Mr. Pillischer] ... designates his 5 £ Prize Medal Microscope, is an excellent student’s instrument, simple and novel in its construction, and well adapted to almost any description of work. ... one of the most portable microscopes for the use of students we have seen.”

Picture to the right, Hogg’s 4th edition, 1859.



5. Well, but what else did Leeuwenhoek do?

“Apparently, the first estimate of the maximum number of people the earth could support was made in 1679 by Anthony van Leeuwenhoek, a Dutch microscopist who turned to larger game. He assumed that the binding constrain on human populations was living space, and the upper limit on human density was that of Holland. From this, he concluded that the limit on human beings on earth was 13,4 billion.” William D. Norhaus, in a review of Joel E. Cohen’s book “How many people can the Earth Support?” The New York Times Book Review, 14 January 1996.

Leeuwenhoek’s assumptions may have been wrong, but the result of his calculations appears uncannily right. The current world population is 6,6 billion, take or live a few people. A genius all around that draper of Delft!

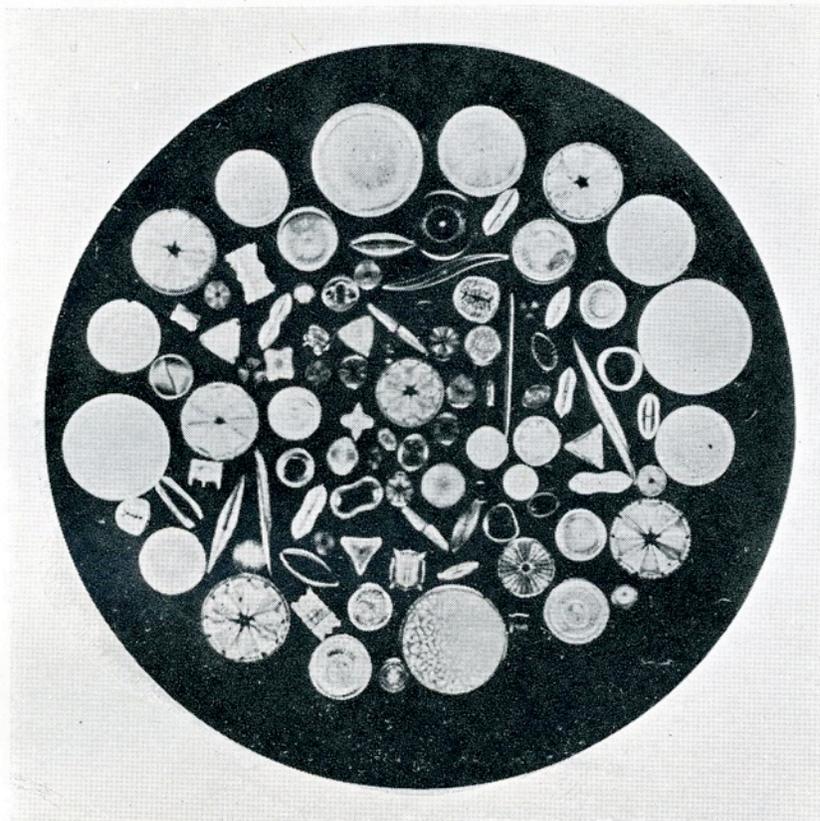


Hunger, the scourge of man and beast; the child of overpopulation (and war).

6. Advocating Pleasureless Photomicrography.

“..., the photographer may be seated at a comfortable fireside by gaslight and produce pictures that are both marvelous and beautiful. But the beginner is warned against letting the mere pursuit of pleasure keep him from the educational advantages of systematic work.” Walter Bagshaw (1902) *Elements of Photo-Micrography*. Ilife & Sons Limited, London, 68 pp.

ELEMENTARY PHOTO-MICROGRAPHY. PLATE IV.



WITH DARK GROUND ILLUMINATION.

Fig. 18. Diatoms. No eyepiece. 1in. objective at 21in. Slow plate. Ten minutes.

Reproduction of one of Mr. Bagshaw's photomicrographs. It shows moderate success in capturing the beauty of diatom frustules. Would the "pursuit of pleasure" have helped him to reach even higher levels?

7. The Saint of the Microscope?

"Jose Gregorio [Hernandez] isn't canonized, but he's Venezuela's national saint because he introduced the microscope in the country. And you want to know how smart he was? He was run over by the only automobile in Caracas at that time." Jaime Manrique (1992) Latin moon in Manhattan, p. 93 (NY, St. Martin's Press).

What is most surprising about this story is that it is mostly true. It is true that Dr. Jose Gregorio Hernandez is not canonized, although the canonization process has begun. It is true he died as a consequence of being run over by an automobile. It is true that to the masses he is already Venezuela's national saint, and his celestial intercession is asked for by many patients and their families. It is true that he introduced the microscope to Venezuela's medical practice (he was trained in Paris and wrote an important book on Bacteriology). However, he is mostly remembered not for that fact but for his exceptional dedication to the poor and sick. A distinguished microscopist with a golden heart.



Picture source: Wikipedia contributors, "Dr. José Gregorio Hernández," (1864-1919) Wikipedia, The Free Encyclopedia.

8. The Dog and the Microscopist.

“Electron microscopy received widespread publicity in its early stages, and undoubtedly many people were naively led to expect too much. It has its limitations! The flea scurries about and his whole world is less than one square yard of a dog. The electron microscopist can be very busy too, and in his whole lifetime not cover as much territory.” Daniel C. Pease (1964) *Histological Techniques for Electron Microscopy*, 2nd. Edit., Academic Press, NY.

Yes, indeed. There were unrealistic expectations for the EM in the late 1950s. Bacteriologists thinking that bacterial identification would require no more than reaching some level of high magnification. Pathologists asking the electron microscopist for help in examining their glass-mounted paraffin sections, and on and on.

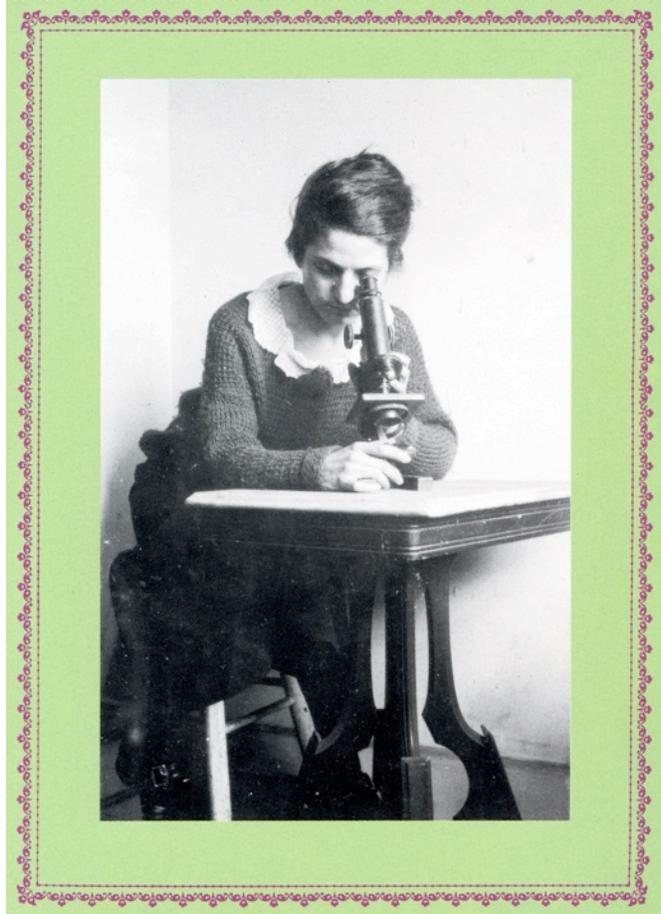


One of the authors with “his” Siemens IA electron microscope. He used electron microscopes for some forty years. It is doubtful that he covered more than a few square cm of tissue section; if that much! The world becomes very big even at a “modest” 10,000X.

9. The Ladies of the Microscope.

“Yesterday I commenced attending lectures on Embryology. Notwithstanding a violent rain, among the company assembled in the lecture room in the College of France, was quite a number of women.”

“Among the lectures, there was one given by Mons. Donne. The experiments he made, were intended to show the circulation of the blood, and they succeeded capitally. The object was accomplished by means of an instrument, called the oxy-hydrogen microscope. It is a species of magic-lantern. The light, which is intense, is produced by the ignition of a piece of charcoal, and directing upon it jets of oxygen and hydrogen. The tongue of a frog, exposed in this manner, was shown so perfectly, that every vein and artery were distinctly visible.”



“Modesty must never stand in the way of science, and, for the sake of listening to this celebrated man, one might be excused for overlooking the many natural and unavoidable indelicacies, connected with the subject of his investigations. It does seem queer though, even in France, to see women attending his lectures with remarkable regularity.”

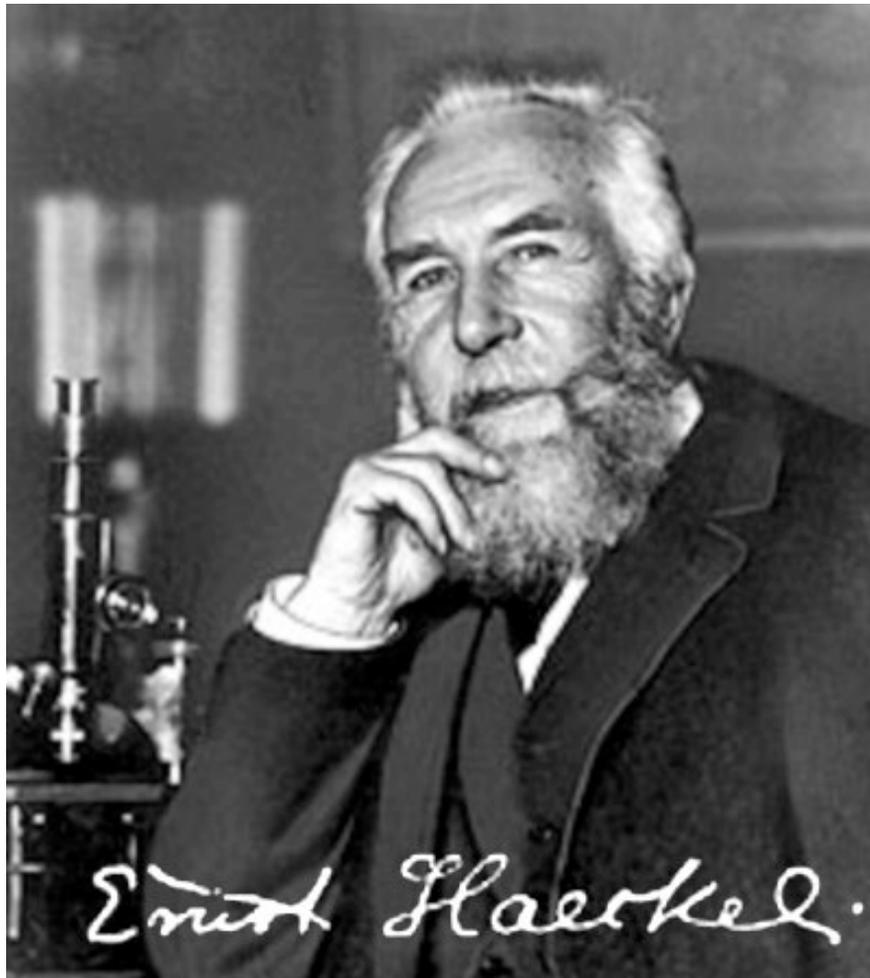
Augustus Kinsley Gardner (1850) Paris; as Seen During the Spare Hours of a Medical Student. Sec. Edit., C. S. Francis & Co., New York, 1850. Excerpts from pp. 216-219.”

Women in an Embryology lecture? No wonder the world has come to what it is!

10. Conflict is the father of all things.

A key aphorism by Ernst Haeckel (1834-1919), the notorious Jena zoologist and main Darwin advocate in the European mainland. The Preface to Little Blue Book No. 49 (87×123×4 mm), published in English as ‘Three Lectures on Evolution’ by the Haldeman-Julius Company in Girard, Kansas, concludes:

“If I seem to be a tactless and inconsiderate ‘fighter,’ I pray you to remember that ‘conflict is the father of all things,’ and that the victory of pure reason over current superstition will not be achieved without a tremendous struggle. But I only regard ideas in my struggles; to the persons of my opponents I am indifferent, bitterly as they have attacked and slandered my own person.”



Fine-focusing down to microscopic interests, we read in Haeckel's third, "farewell" lecture (pages 70-71), entitled 'The Controversy over the Soul,' delivered in Berlin on April 19, 1905:

"Comparative psychology had traced connectedly the long gradation from man to the higher animals, from these to the lower, and so on down to the very lowest. At the lowest stage it found those remarkable beings, invisible with the naked eye, that were discovered in stagnant water everywhere after the invention of the microscope ... I still recall with pleasure the stimulating excursions that I made fifty years ago with my teacher Ehrenberg, and a few other pupils, to the Zoological Gardens in Berlin. Equipped with fine nets and small glasses, we fished in the ponds of the Zoological Gardens and in the Spree, and caught thousands of invisible micro-organisms, which then richly rewarded our curiosity by the beautiful forms and mysterious movements they disclosed under the microscope."

Haeckel's classical book
Nature as an Artist
(1913)

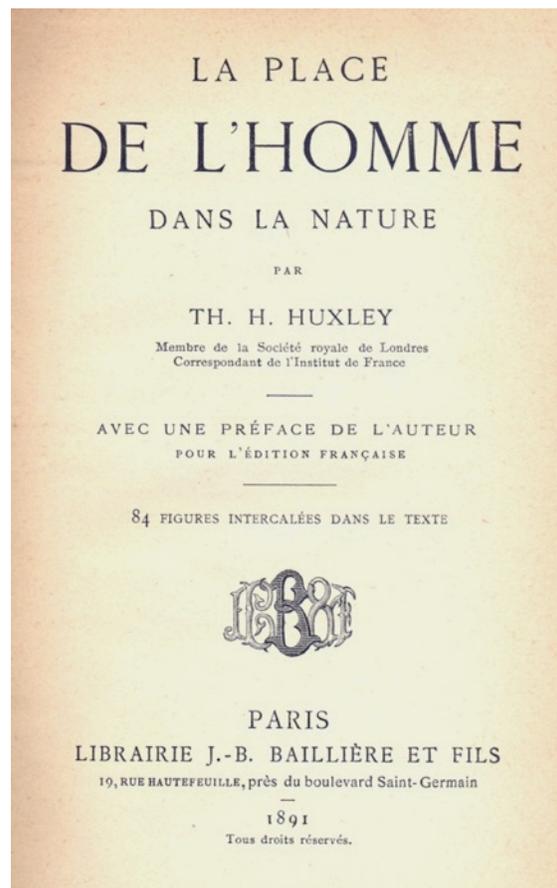


I I. Man's Place in Nature.

In approaching the sesquicentennial of the 'Origin of Species' (1859-2009), it never hurts to reiterate the famous exchange between Sir Charles Darwin's "bulldog," the biologist Thomas Henry Huxley (1825-1895), and Bishop Samuel Wilberforce (1805-1873) on June 30, 1860 in Oxford:

Wilberforce sarcastically asked whether Mr. Huxley descended from an ape on his grandfather's or grandmother's side of the family. Huxley reportedly whispered, "The Lord hath delivered him into my hands" and rising, asserted that he would rather have an ape for a relative than a man who uses his intellect to substitute ridicule for truth. Pandemonium ensued.

**(Reference: Natural History Museum, Thomas Henry Huxley.
<http://www.nhm.ac.uk>)**



12. The infinitely great and the infinitely little.

The following citation derives from ‘The Universe: or, the Infinitely Great and the Infinitely Little’ (9th English edition, 1886) by Félix-Archimède Pouchet, M.D. (1800-1872), the Rouen professor and spontaneous generation advocate, whom Louis Pasteur (1822-1895) crushed through his most famous experiment in front of the French Academy of Sciences (albeit inspired by the latter’s vitalist convictions, cf. Christian de Duve, *Life Evolving*, Oxford, 2002, footnote 8 on page 315).

“Nothing gives a more brilliant idea of the universal diffusion of life throughout space, than the prodigious number of organisms which we meet everywhere and in all bodies. The demonstration of this fact is one of the most recent and magnificent conquests achieved by science. We owe it to the microscope, discovered about a century and a half ago. This instrument at once displayed to men objects so new, striking, and unexpected, that it was everywhere admitted to have opened up a new world, by conferring, as it were, upon us an additional sense wherewith to investigate the invisible.

When we read the works of naturalists, and see them penetrating so deeply into the most recondite secrets of the anatomy and habits of beings, the very existence of which the eye could not lead us to suspect, we are apt to ask if the pride of genius has not led it beyond the simple realities of nature; and hence, for a long time, the statements of microscopists were, by some obstructive minds, regarded as fables. But when we see their instruments, and observe the remarkable precision with which they are constructed, we at once conclude that, however marvellous their investigations appear, there has been no self-deception in their case.”



THE UNIVERSE:

OR,

THE INFINITELY GREAT
AND THE INFINITELY LITTLE.

BY

F. A. POUCHET, M.D.

CORRESPONDING MEMBER OF THE INSTITUTE OF FRANCE (ACADÉMIE DES SCIENCES),
AND OF THE ROYAL INSTITUTE OF ITALY;
DIRECTOR OF THE MUSEUM OF NATURAL HISTORY AT ROUEN.
OFFICER OF THE LEGION OF HONOUR, ETC.

ILLUSTRATED BY 270 ENGRAVINGS ON WOOD,
FROM DRAWINGS BY A. FAGUET, MESNEL, AND ÉMILE BAYARD.

NINTH EDITION, THIRTIETH THOUSAND.



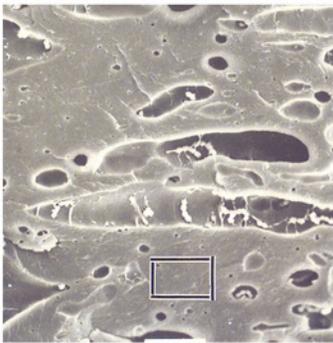
LONDON:
BLACKIE & SON, OLD BAILEY, E.C.;
GLASGOW AND EDINBURGH.

13. Flavorful Microscopy.

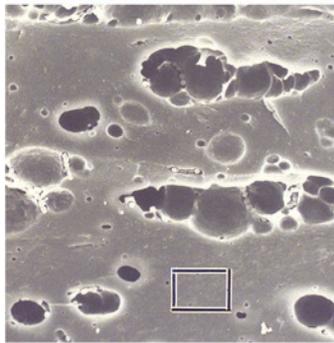
“The annual production of Mozzarella cheese in the U.S.A. was about 2 billion pounds in 1992 (Cheese Facts, 1993), The increase in the production of mozzarella cheese is fueled by the increase in the popularity of Pizza. In 1993, the annual sales of the pizza industry were about \$ 30 billion, and the total value of cheese sold for pizza is estimated to be over \$ 3 billion in the U. S. A.”



Electron Microscopy of Mozzarella Cheese



Zero Time



6 Weeks

“For light microscopy, the cheeses were cut into prisms (2mm x 3mm x 10 mm) fixed in glutaraldehyde ... before cryosectioning (10 μ m sections). For SEM and TEM, prisms of cheese (1mm x 1mm x 10 mm) were fixed in glutaraldehyde, ...and freeze fractured under liquid nitrogen.” J. Yun (1997) Current trend in mozzarella cheese research. Cell Vision 4:262.

CONCLUSION: Happy the cheese microscopists who can enjoy their microscopes and their pizzas at the same time! With this savory note we close this rendition of Microcitations

