CD Publications of interest to Diatomists

All titles available from Savona Books

	Author/Company	Title/Description	Price UK Pounds
M3.	Griffith and Henfrey	Micrographic Dictionary 4th Edition. 1883. Plates only	£8
M4.	Flatters & Garnett	1929 Microslide Catalogue includes images of slides.	£10
M7.	P. T. Cleve	Diatoms from the West-Indian Archipelago 1878. pp20 Text Pages, 5 Tafels.	£10
M8.	J. Brun et J. Tempere	Diatomees fossiles du Japon 1889. 73 Pages, 9 Plates.	£10
M9.	Peragallo et Peragallo	Diatomees marines de France. 1897-1908. 137 Plates and Plate text only (with hyperlink indices)	£15
M10.	F. T. Kutzing	Synopsis diatomearum. 1834. 93 Pages, 7 Plates.	£8
M16.	Hilmar v. Schonfeldt	Die Deutschen Diatomeen des Susswassers und des Brackwassers - 1907. 19 Plates	£8
M17.	Adolf Schmidt	Atlas der Diatomaceenkunde - first 268 plates with hyperlink Index.	£35
M19.	Leuduger-Fortmorel	Diatomees Marines de la Cote Occidentale d-Afrique (Plates and hyperlink Index) 1898. 39 Pages, 8 Plates.	£6
M20.	Luard and Witt	Die Diatomaceen der Polycystinenkreide von Jeremie in Hayti. 1888. 25 Pages,7 Plates.	£5
M35.	Arthur Scott Donkin	The Natural History of the British Diatomaceae	£10
M36.	Jacob Whitman Bailey	Notes on New Species of microscopical Organisms	£5
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M43.	Rev. William Smith	List of the Diatomaceae in the British Museum 1859	£5
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M45.	Otto Muller	Kammern und Poren in der Zellwand der Bacillariaceen 1899-1901	£5
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M48.	Dr. József Pantocsek	A FERTŐ TÓ KOVAMOSZAT VIRÁNYA (Bacillariae Lacus Peisonis) 1912	£5
M49.	Dr. Josef Pantocsek	BESCHREIBUNG und ABBILDUNG der FOSSILEN BACILLARIEN des ANDESITTUFFES von SZLIÁCS in UNGARN 1903	£5
M50.	E. G. Grahn M.D.	Diatomaceae found in the neighborhood of Brookville, Indiana, 1885	£4
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M71.	Little Imp	Diatomaceae on Magic Lantern Slides V.1.0.	£3
M72.	Alfredo Truan y Luard	Diatomeas de Asturias 1844	£5
M73.	Little Imp	A Checklist of Diatoms of the Central U.S.A.	£3
M74.	Little Imp DiatCode -	List of Diatom Species with Int. codes	£3
M76.	Various Authors	Practical Direction for collecting, Preserving, Transporting, Preparing and Mounting Diatoms	£4
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M80.	William Smith	A Synopsis of the British Diatomaceae	£10
M81.	J. D. Moller	Diatomaceen Typen-Platte 335	£4

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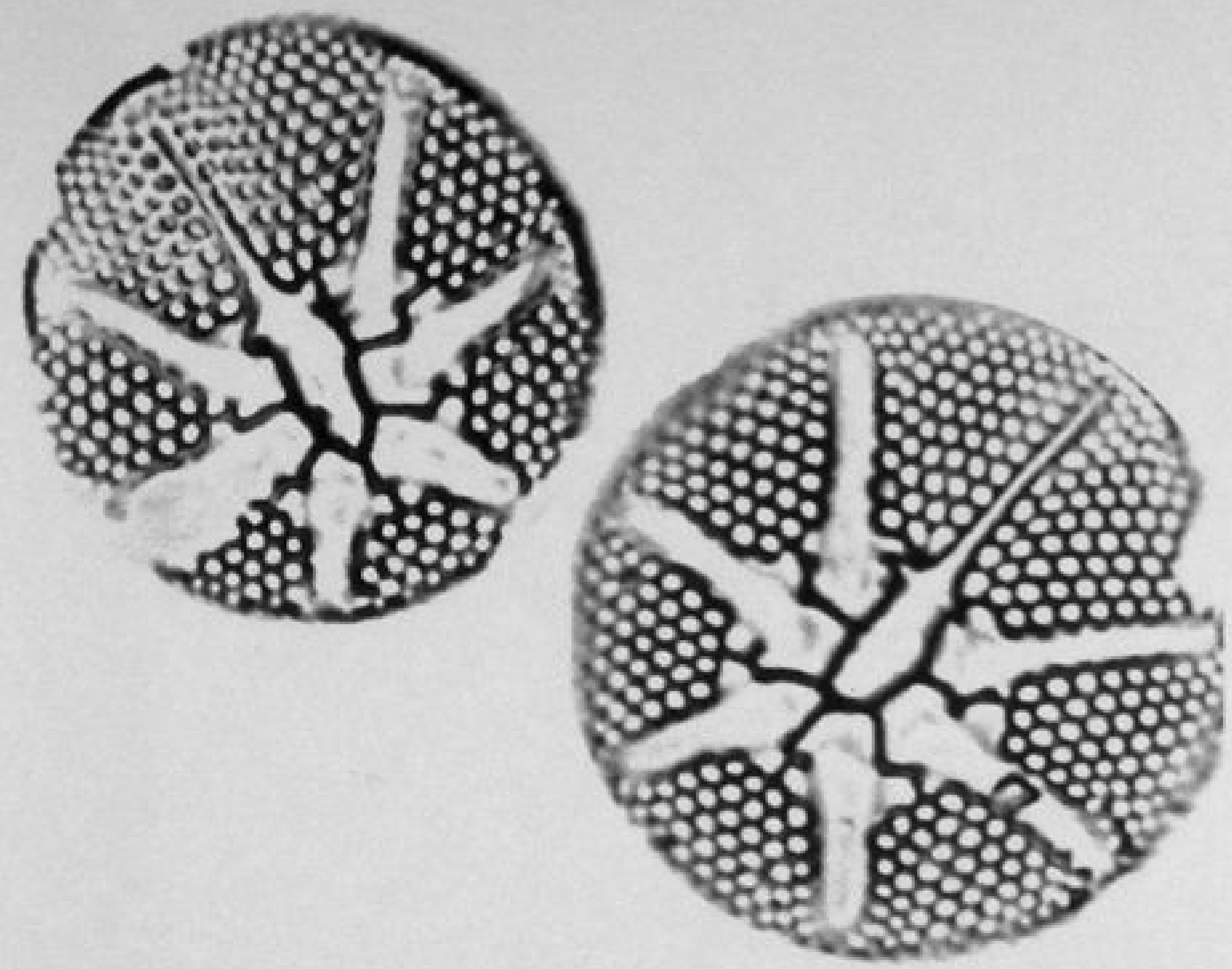
The Amateur Diatomist

Vol. IV. No. II. **July 2007**

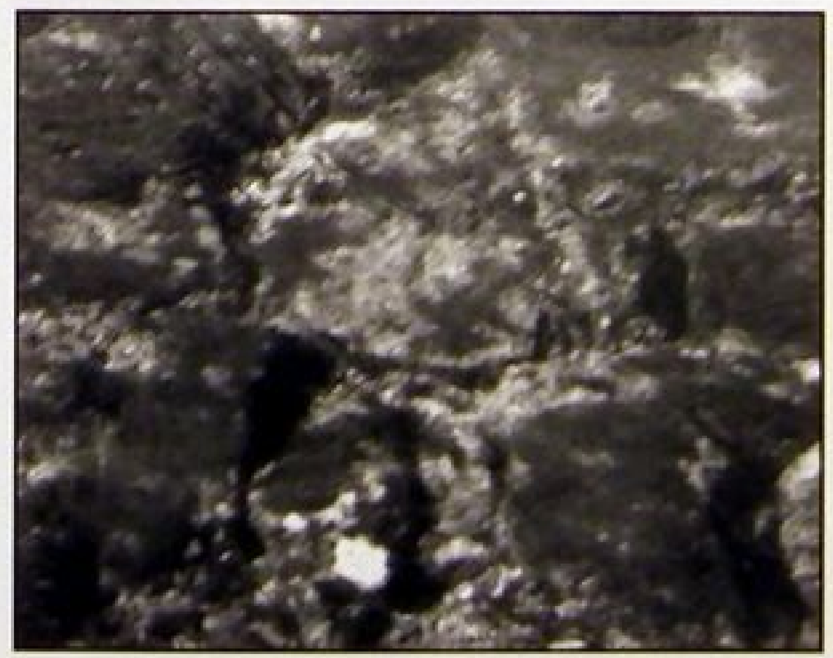
Little Imp Publications



A Wintry Return to Malham Tarn

by Steve Gill & Mike Samworth

In November 2005 we made our biennial trip to Malham Tarn. November has never really been very productive diatom-wise for us at this altitude. By November there has normally been a prolonged period of cold weather, the Tarn has been frozen and thawed a dozen or so times and the rocks and weeds have been bare. It initially appeared that this dearth of diatom flora would be the case this time as when we arrived the Tarn was two thirds frozen. A few open areas persisted. Ever the optimists we walked the shorline to the outlet at the Tarn's southern tip. There was a goodly flow of water over the lip and onto the cobbles that lined the outflow - and here we came upon a magnificent bloom.



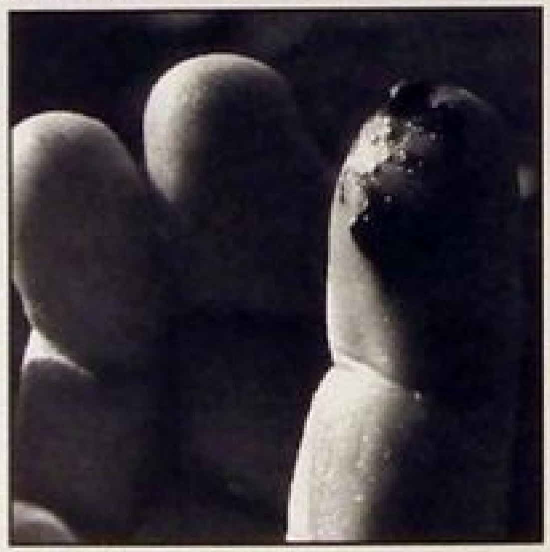
The cobbles were festooned with a luxuriant brown growth that waved back and forth in the current.

Each 'colony' bore streamers some 2.5 to 3 inches long.

Our immediate reaction was 'Diatoma'.

The water was really cold and neither of us particularly wanted to get wet or even lie on the ground. After drawing straws Mike eased himself down and dipped his hand.

(Mike - I cheated!)

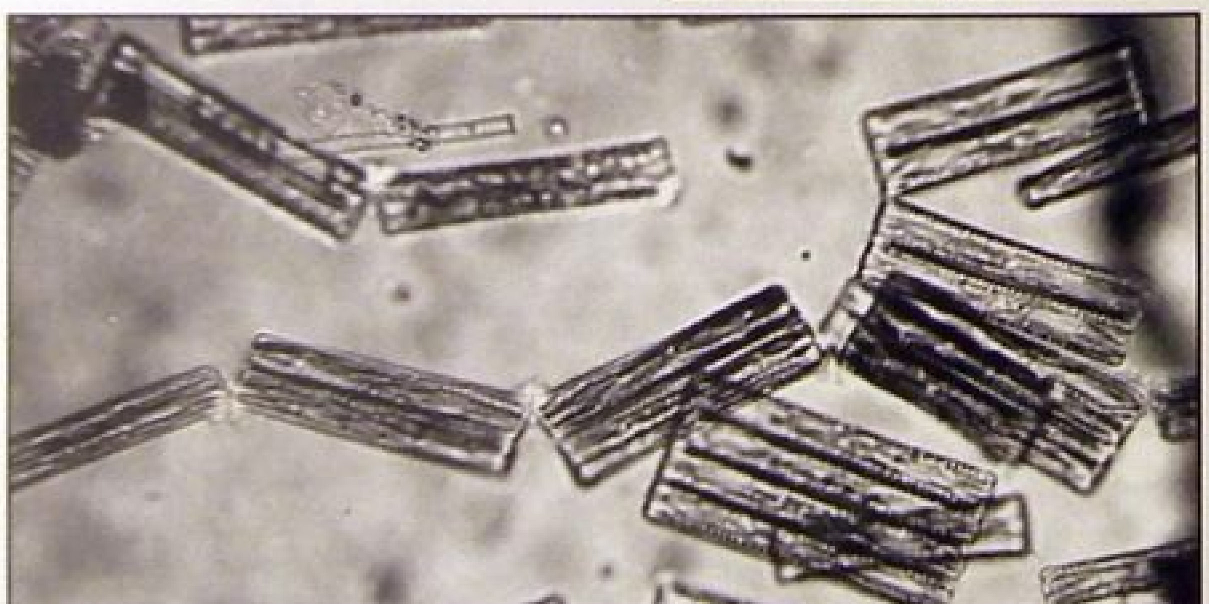


The sample looked good, but not the filamentous form that we expected. Whilst in the water the filaments were obvious but as soon as it was removed it seemed to collpase into an amorphous mass with no indication of the structure that existed in the flow of the outfall.

Nonetheless, a goodly sample was collected and we retired to the warmth of the laboratory block at Tarn House .

Almost as soon as the sample was placed on the slide the filaments reappeared.

Under the microscope the reason became clear.

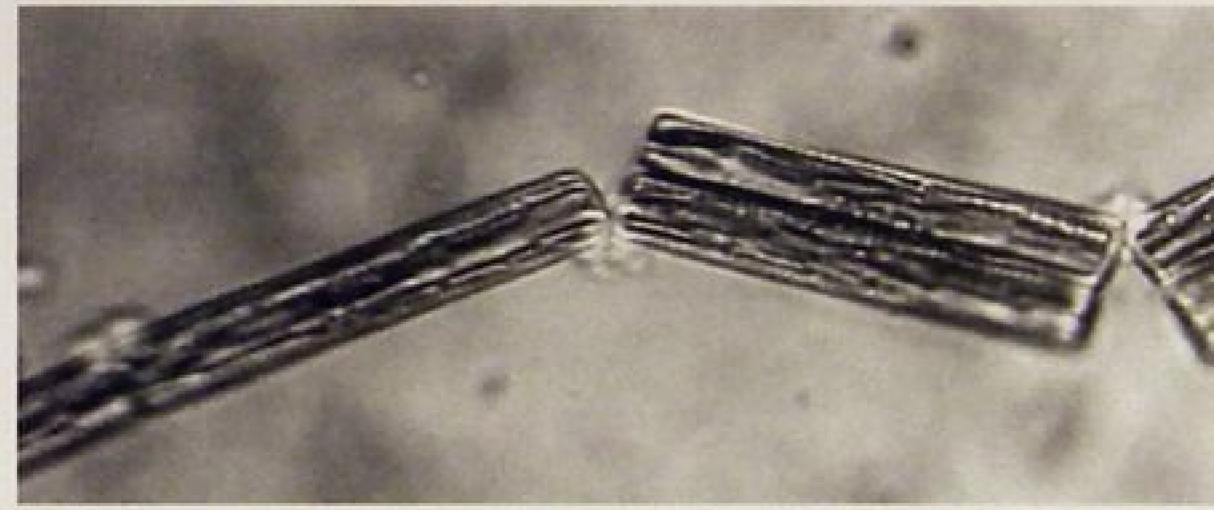


This Tabellaria species forms 'chains', not by face to face contact but, by 'anchoring two frustules by an adjacent corner with a mucus secretion.

A number of things were noticed:

(i) it wasn't all frustules that went into this chain forming mode. Some were face to face joined and only one of this group would form a 'bond' with another via a mucus link.

(ii)the mucus links were always formed diagonally opposite on the same frustule. This results in a zig-zag formation.



Whilst observing this sample and teasing the mounted sample it occurred to us that the 'bond' between these individuals was quite strong and it wasn't easy to split them apart.

What forces, we wondered, were required to maintain the links?

In the running water a single 'bond' would need to resist the force of running water acting upon up to 2.5 inches of chain. Perhaps some of the force was transmuted into sideways motion and thus dissipated but still a considerable portion of the forces applied must bear upon the 'bond' itself (and one assumes to the bond at the point where the complete colony is anchored to the substrate.

Unfortunately we are not physicists and have no idea how to go about measuring things, other than sizes, on this minute scale.

We certainly think this would be an interesting exercise if only we knew how to go about it and had the necessary equipment.

Should anyone have any ideas (or perhaps this work has already been done and published somewhere) then we would be delighted to hear of such.

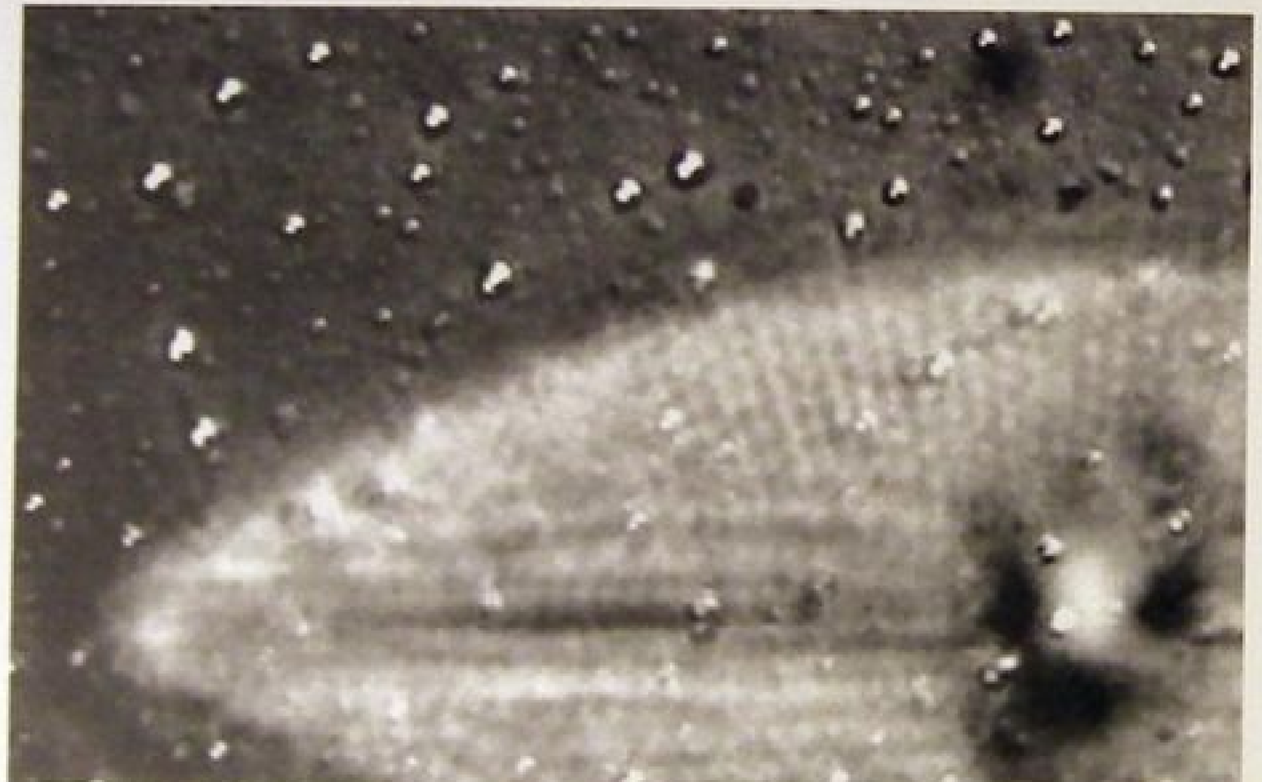
In the meantime we would discourage anyone from despondency when faced with what appears to be a barren environment. A little time spent exploring will undoubtedly bring to light a micro-habitat that is just right for diatoms, regardless of the macro-environment in which it sits.

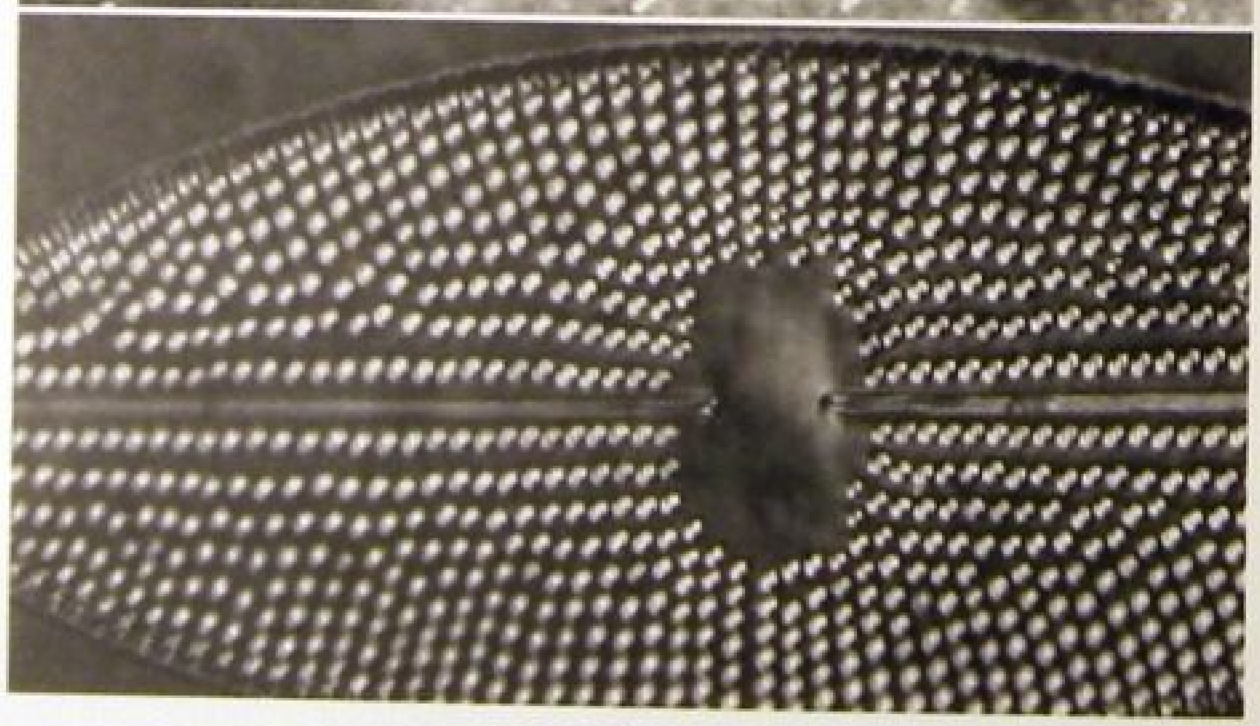
Temperature, it seems, is only a deterent to errant diatomists, and not to diatoms!

Naphrax - another example

Further to the article in Vol. III. No. IV on the presence of 'oily globules' in a relatively recent mount using Naphrax. At the time we were very willing to believe that some form of cleansing agent left as a residue on the slide was the cause of this unsightly deterioration.

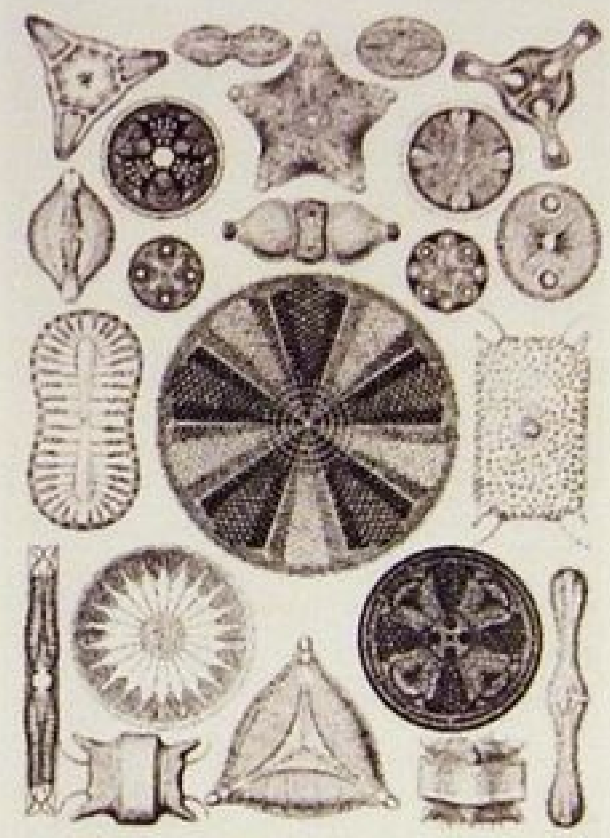
However, since then we have examined more, and older, preparations. Quite a number of these have displayed the same phenomenon. The example below is from a R. Gosden slide mounted on the 20th June 1963. The two photographs below show the problem but also illustrate that the specimen encased therein is still viewable.





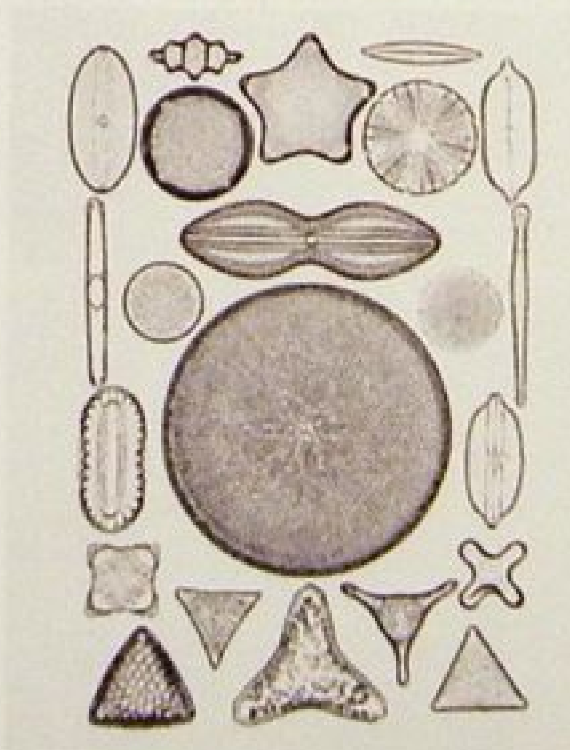
Haeckel's Plates Interpreted

Some new images for you. I was inspired by Ernst Haeckel's "Artforms in Nature" to do the following mounts. - **by Stephen Nagy**

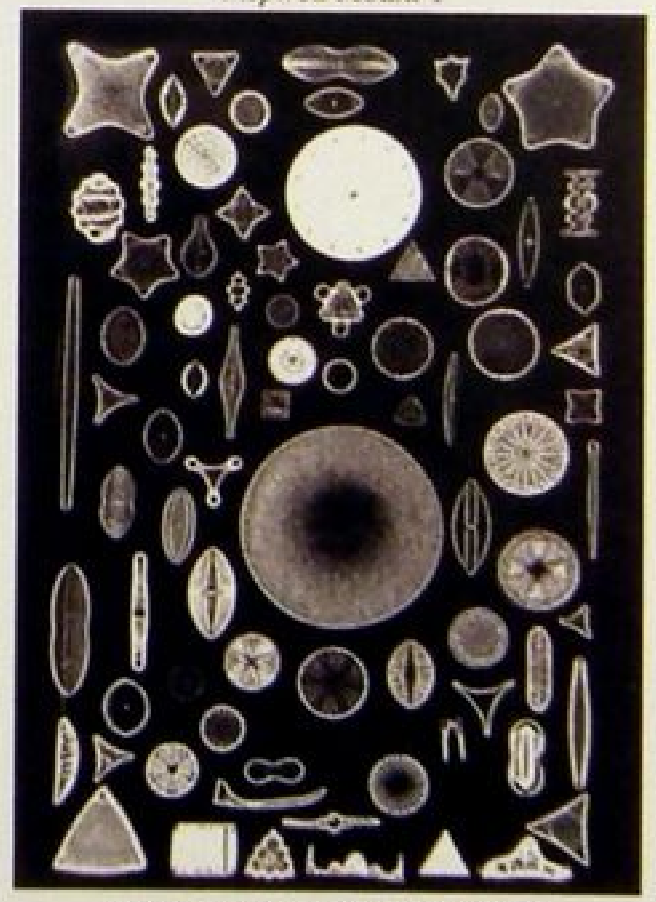


Original Plate

Inspired Mount 1



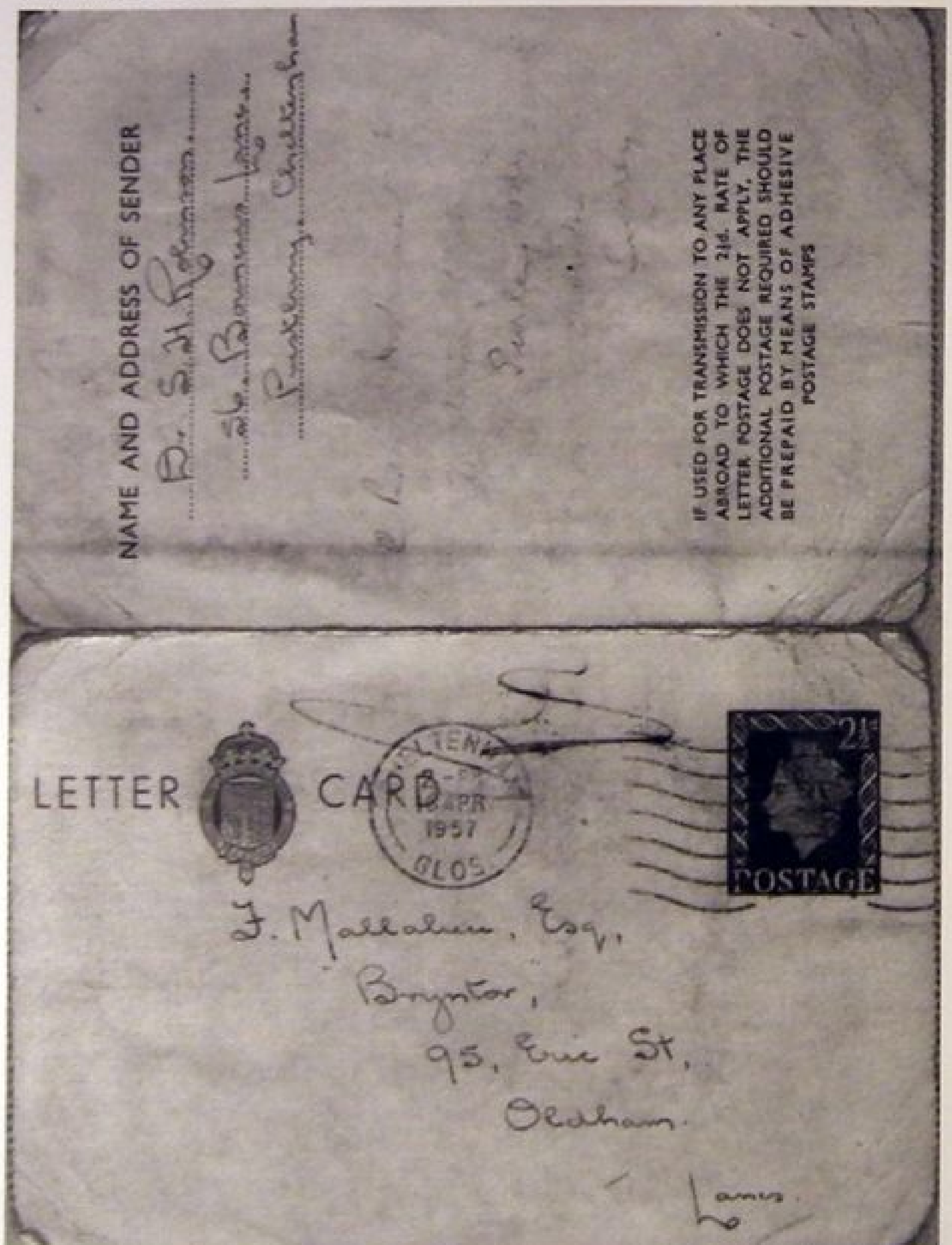
Inspired Mount 2

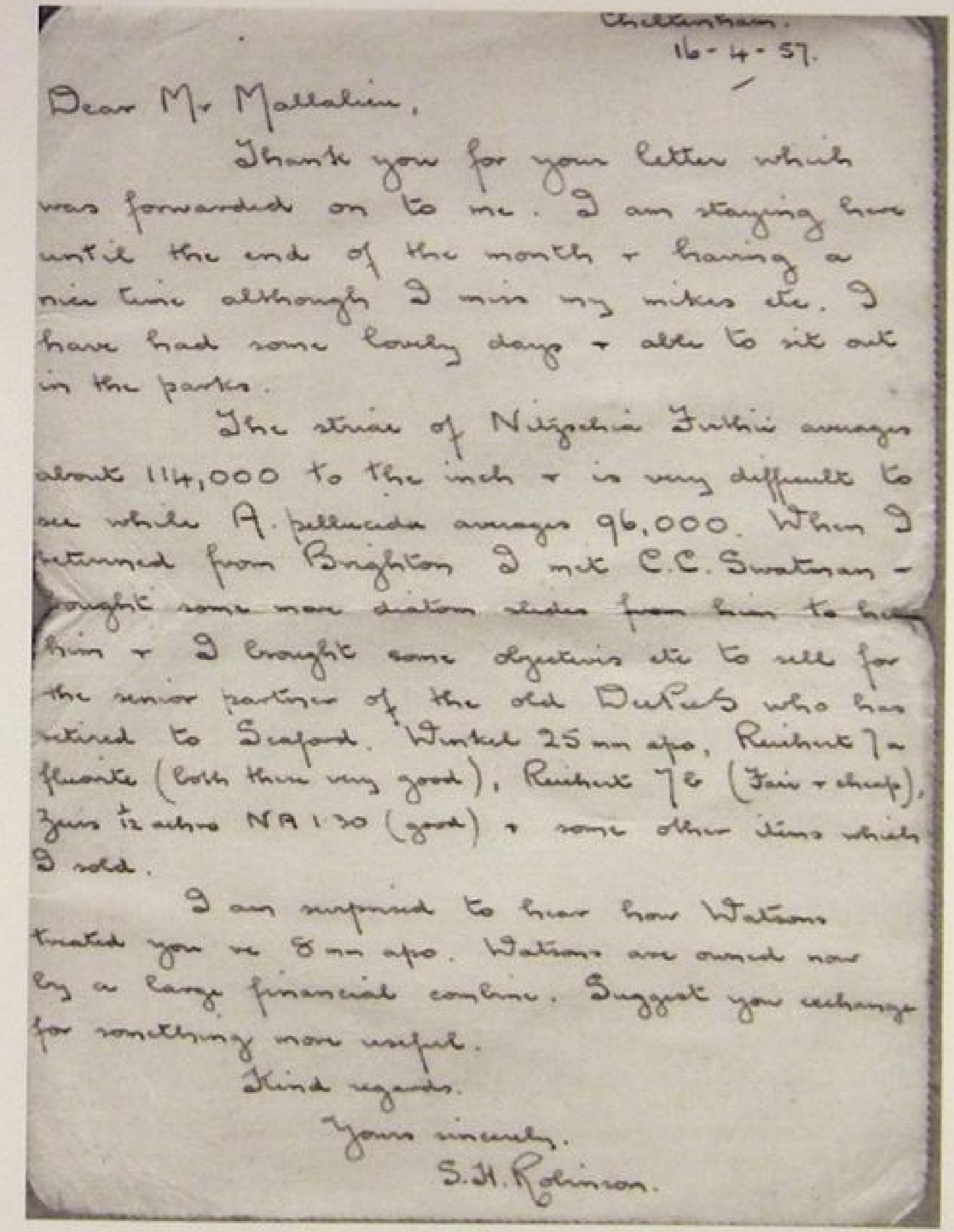


Inspired Mount 3 (Darkground)

Robinson & Mallalieu

Notes and letters from past mounters are always interesting, and the more so when they refer to diatoms. The following note came our way by way of a friend. It is simply a single communication between Mr. S. H. Robinson and Mr. F. Mallalieu.





Cheltenham.
16-4-57.

Dear Mr Mallalieu,

Thank you for your letter which was forwarded on to me. I am staying here until the end of the month & having a nice time although I miss my mikes etc. I have had some lovely days & able to sit out in the parks.

The striae of Nitzschia Frithii averages about 114,000 to the inch & is very difficult to see while A. pellucida averages 96,000. When I returned from Brighton I met C.C. Swatman – bought some more diatom slides from him to help him & I brought some objectives etc to sell for the senior partner of the old DuPals who has retired to Seaford. Winkel 25 mm apo, Reichert Fluorite (both these very good), Reichert 7a (fair & cheap), Zeiss ½ achro NA 1.30 (good) & some other items which I sold.

I am surprised to hear how Watsons treated you re 8 mm apo. Watsons are owned now by a large financial combine. Suggest you exchange for something more useful.

Kind regards.

Yours sincerely.

S.H. Robinson.

The text overleaf is a transcription of this letter.

To. F. Mallalieu Esq.
Bryntor
95 Eric St.
Oldham
Lancs

Cheltenham
16-4-57

Dear Mr. Mallalieu,
Thank you for your letter which was forwarded on to me. I am staying here until the end of the month & having a nice time although I miss my mikes etc. I have had some lovely days & able to sit out in th parks.
The striae of Nitzschia Firthii averages about 114,00 to the inch & is very difficult to see while A. pellucida averages 96,000. When I returned from Brighton I met C. C. Swatman & bought some more diatom slides from him to help him & I brought some objectives etc to sell for the senior partnet of the old DeePees who has retired to Seaford. Winkel 25mm apo, Reichert 7a fluorite (both these very good), Reichert 7b (Fair & cheap), Zeiss 1/12 achro NA 1.30 (good) & some other items which I sold.
I am surprised to hear how Watsons treated you re 8mm apo. Watsons are owned now by a large financial combine. Suggest you exchange for something more useful.
Kind regards,
Yous Sincerely,
S. H. Robinson.

From Dr. S. H. Robinson
56 Bowness Lane,
Prestbury
Cheltenham

This provides lots of information which is useful when considering the history of Diatomists.
The information below is that I have gleaned over the years.

Robinson, S. H. - Lincoln
There was an S. H. Robinson advertising in Science Gossip May 1883
Exchange column as follows:-
'Send three well mounted micro slides for a bottle of brown cement, a larger one for six slides. - S. H. Robinson, 20 Branston Road, Burton-on-Trent.'
and
Science Gossip August 1883 Exchange column -
'For exchange for slides, viz. : fluid for preserving organic substances, Dean's compound glycerine and gum, glass-cleaning solution, preserving

fluid for animalcula, zinc oxide cements (red, white, blue and yellow), fluid for infusoria, double stain for vegetable tissues (vide Science Gossip, Vol. XVI, p6.), brown cement, concentrated solution of chloride of lime, asphalte varnish, not Brunswick black), and several others; write for list, post free. - S. H. Robinson, 20 Branston Road, Burton-on-Trent.

Coolpix as a Microscope

We have been given an adapter by Dr. Brian Bracegirdle which may have some possibilities. It allows for a microscope objective to be mounted onto a 28mm Coolpix thread. It certainly has possibilities and we will keep everyone informed.

A Meakin Digression

A couple of months ago Steve Edgar emailed me with a most interesting conjecture. It all revolved around a plate his wife had acquired from a relation. The plate was of 'willow pattern' design and was manufactured by Alfred Meakin.

A rather nice aside here is the story of the Willow Pattern.

The Willow Pattern.

The Willow Pattern is one of the most famous British ceramic designs. The scene of a temple with bridge, boat and willow tree was inspired by images found on Chinese ceramics, but was the creation of British manufacturers. The love story it supposedly depicts was invented later as a clever marketing tool.

The Willow Legend

There was once a Mandarin who had a beautiful daughter, Koong-se. He employed a secretary, Chang who, while he was attending to his master's accounts, fell in love with Koong-se, much to the anger of the Mandarin, who regarded the secretary as unworthy of his daughter.

The secretary was banished and a fence constructed around the gardens of the Mandarin's estate so that Chang could not see his daughter and Koong-se could only walk in the gardens and to the water's edge.

One day a shell fitted with sails containing a poem, and a bead which Koong-se had given to Chang, floated to the water's edge. Koong-se knew that her lover was not far away.

She was soon dismayed to learn that she had been betrothed to Ta-jin, a noble warrior Duke. She was full of despair when it was announced that her future husband, the noble Duke, was arriving, bearing a gift of jewels to celebrate his betrothal.

However, after the banquet, borrowing the robes of a servant, Chang passed through the guests unseen and came to Koong-se's room. They embraced and vowed to run away together. The Mandarin, the Duke, the guests, and all the servants had drunk so much wine that the couple almost got away without detection, but Koong-se's father saw her at the last minute and gave chase across the bridge.

The couple escaped and stayed with the maid that Koong-se's father had dismissed for conspiring with the lovers. Koong-se had given the casket of jewels to Chang and the Mandarin, who was also a magistrate, swore that he would use the jewels as a pretext to execute Chang when he caught him.

One night the Mandarin's spies reported that a man was hiding in a house by the river and the Mandarin's guards raided the house. But Chang had jumped into the raging torrent and Koong-se thought that he had drowned.

Some days later the guards returned to search the house again. While Koong-se's maid talked to them, Chang came by boat to the window and took Koong-se away to safety.

They settled on a distant island, and over the years Chang became famous for his writings. This was to prove his undoing. The Mandarin heard about him and sent guards to destroy him. Chang was put to the sword and Koong-se set fire to the house while she was still inside.

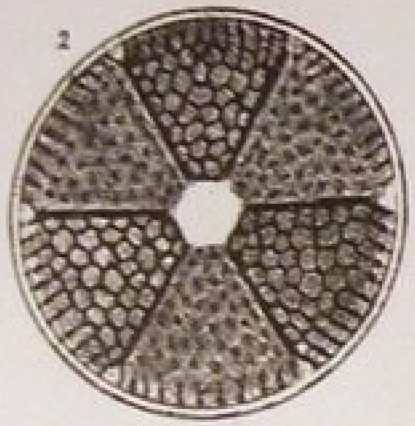
Thus they both perished and the gods, touched by their love, immortalised them as two doves, eternally flying together in the sky.

So what has any of this got to do with Diatoms?

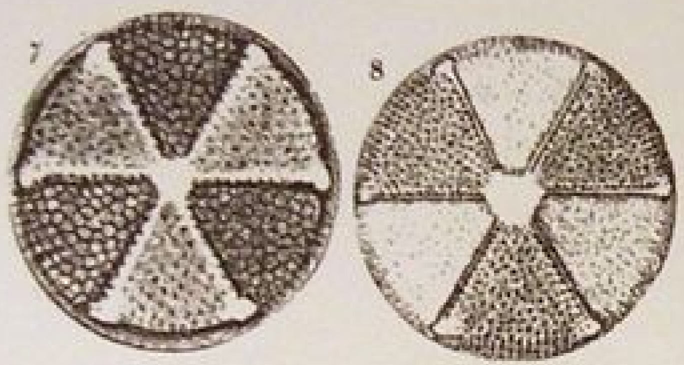
Well, the name Meakin could be a clue. Was Arthur Meakin any relation to Samuel Henry Meakin or Stanley Meakin the famous father and son team. A somewhat tenuous link perhaps but when one examines the plate design a little closer then maybe there's something there. Look at the design below.

Look particularly at the circular element. Does this bear any resemblance to a diatom you might

already know? And this is where Steve became interested.
Could it be that an interest in diatoms had inspired the pattern in the border of the willow pattern



Actinoptychus aster



Actinoptychus biformis

Actinoptychus heliopelta

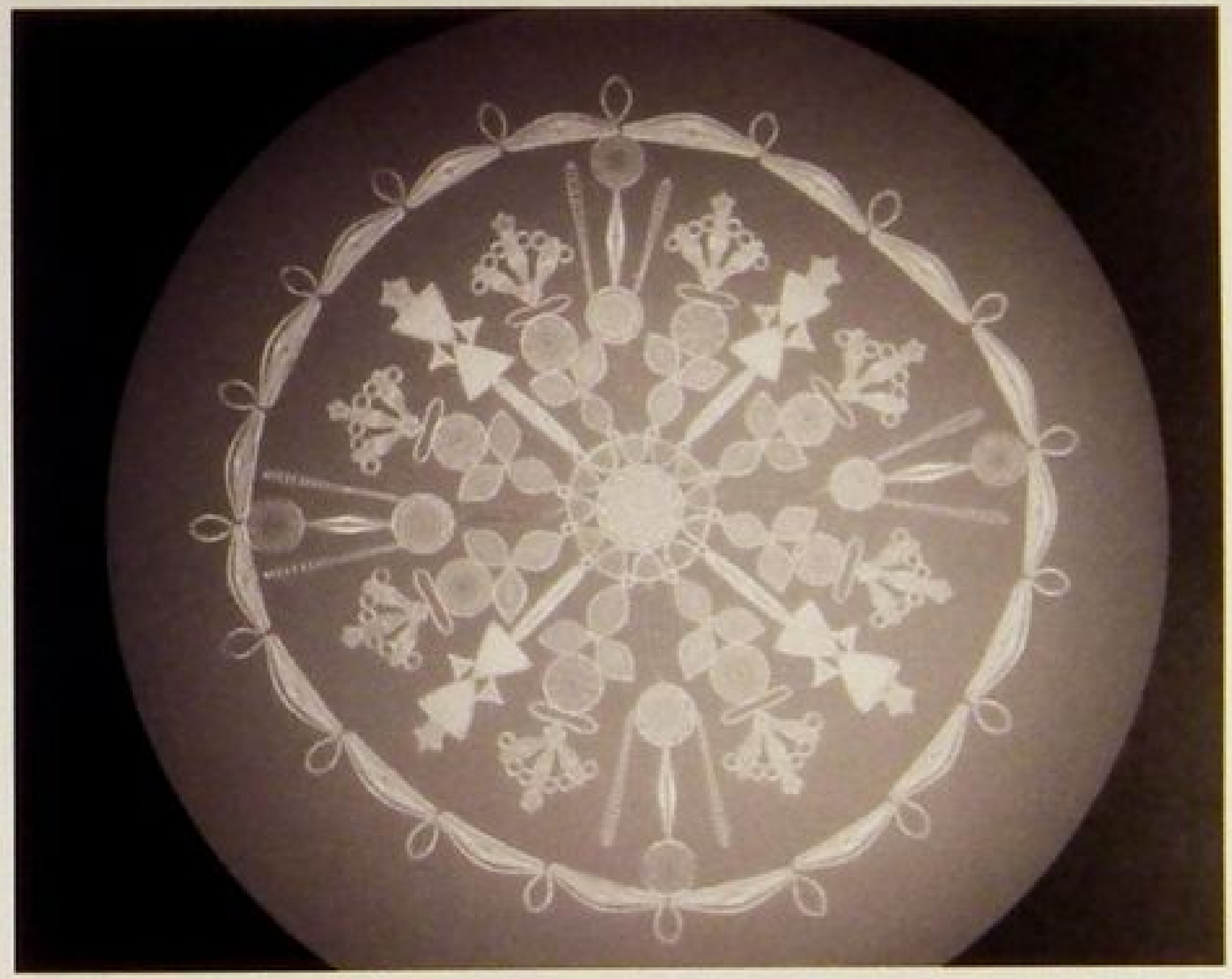
plate.
A check on the family tree of Alfred Meakin and Samuel Henry Meakin revealed that they were not related, so one hadn't influenced the other.
As a matter of interest the Alfred Meakin story, much condensed, is as below:-
1848 - Alfred Meakin - born, the son of potter James Meakin who manufactured pottery at Newtown Works, Uttoxeter Road, Longton.
1875 - Alfred Meakin commenced pottery manufacture at Royal Albert Pottery, Tunstall. He also operated at the Victoria Pottery and Highgate Potteries.
1897 - The company became a limited company - "Alfred Meakin Ltd."
1904 - Alfred Meakin died and was succeeded at the pottery works by his son Alfred James Meakin (who died 4 years later).
Even though there is no link it shows that observation of apparently insignificant detail can have interesting results. I hope you enjoyed this aside.

Low-power Darkfield

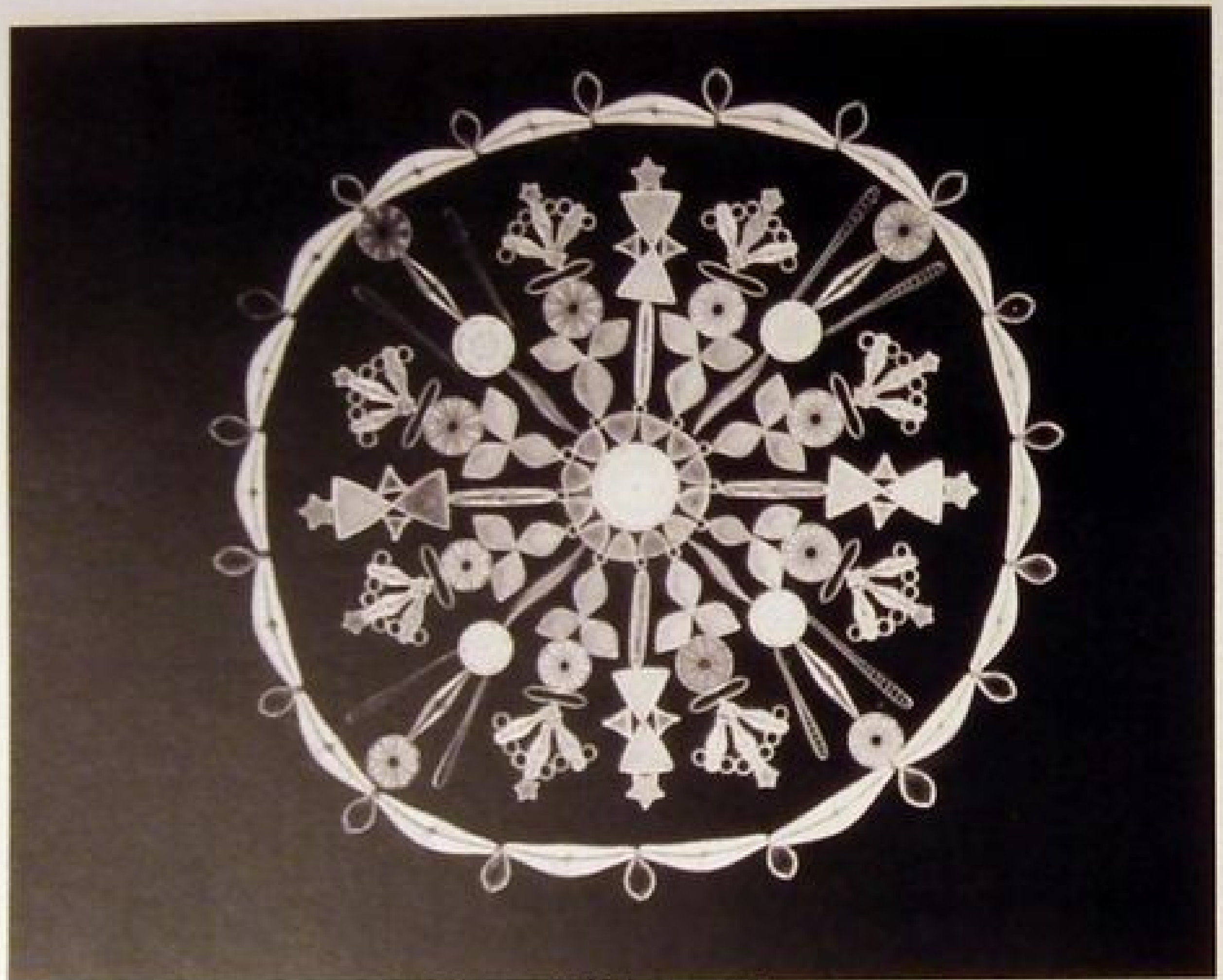
by Stephen Nagy

Just a quick note to show you some images where all else is the same except for the darkfield condenser. As you, no doubt, know, low-power darkfield is very difficult, because finding a condenser which will illuminate the whole, large specimen evenly is a challenging task. Most darkfield condensers are made to illuminate a field of very small diameter.
I have two photos attached, both where all else is the same except for the condenser. In the first case we have a darkfield image of a Klaus Kemp large diatom exhibition mount using a Heine condenser as the light source.

Note that the Heine was not oiled to the slide, which probably would have increased contrast. The image looks pretty washed out, with unimpressive contrast.



In the second case (next page) we have a darkfield image using a condenser made using a Zeiss Epiplan neofluar 5x objective, with a special slider to create darkfield. The condenser was the brainchild of Eberhardt Beier, a Zeiss master technician in Canada, originally designed to illuminate whole
sections of mouse brain in darkfield. Apparently the Zeiss Canada folks sent the idea to Zeiss Oberkochen to put into production, but it cost too much and was never more than a special order.
Note that these were photographed at very low resolution with the goal of comparing the illumination ONLY, and that there was no effort made to use a higher pixel density to capture detail. (This was the lowest resolution setting on the Coolpix.) The objective was a Nikon 10x 0.45 CFN planapo.
Apparently this thing will illuminate the whole field of a 2.5 plan objective; I have seen it with a 4x objective and the evenness of the illumination is impressive, even at these challenging low powers.
The Beier condenser has moved in with me here.



Uses of Diatomite

ALFRED NOBEL OF HAMBURG- GERMANY ASSIGNOR TO JULIUS BANDMANN OF SAN FRANCISCO CALIFORNIA.
Letters Patent dated May 26 1868.

IMPROVED EXPLOSIVE COMPOUND.

TO ALL WHOM IT MAY CONCERN:
Be it known that I Alfred NOBEL of Hamburg Germany have invented a new and useful Composition of Matter to wit an Explosive Powder.
The nature of the invention consists in forming out of two ingredients long known viz. the explosive substance nitro-glycerine and an in-explosive porous substance hereafter specified a composition, which without losing the great explosive power of nitro-glycerine is very much altered as to its explosive and other properties being far more safe and convenient for transportation storage and use than nitro-glycerine.
In general terms my invention consists in mixing with nitro-glycerine a substance which possesses a very great absorbent capacity and which at the same time is free from any quality which will decompose, destroy or injure the nitro-glycerine or its explosiveness.
It is undoubtedly true as a general rule that nitro-glycerine when mixed with another substance results in less concentration of power than when used alone; but while the safety of the miner (to prevent leakage into seams in the rock) prohibits the use of nitro-glycerine without cartridges

which latter must of course be somewhat less in diameter than the bore-holes which are to contain them the powder herein described can be made to form a semi-pasty mass which yields to the slightest pressure and thus can be made to fill up the bore-hole entirely. Practically, therefore, the miner will have as much nitro-glycerine in the same height of bore-hole with this powder as with nitro-glycerine in its pure state.
This is the real character and purpose of my invention; and in order to enable others skilled in the art to which it appertains (or with which it is most nearly connected) to make compound and use the same I will proceed to describe the same and also the manner and process of making, compounding and using it in full clear and exact terms.
The substance which most fully meets the requirements above mentioned so far as I know or have been able to ascertain from numerous experiments is a certain kind of siliceous earth found in various parts of the globe and known under the several names of siliceous marl, tripoli, rotten-stone, &c. The particular variety of this material which is best for my compound is homogeneous has a low specific gravity great absorbent capacity and is generally composed of the remains of infusoria.
So great is the absorbent capacity of this earth that it will take up about three times its own weight of nitro-glycerine and still retain its powder-form thus leaving the nitro-glycerine so compact and concentrated as to have very nearly its original explosive power; whereas if another substance having a less absorbent capacity is used a correspondingly less proportion of nitro-glycerine will be absorbed and the powder be correspondingly weak or wholly in-explosive
For example most chalk will take but about fifteen per cent. of nitro-glycerine and retain its powder-form. Twenty per cent. will reduce it to a paste.
Porous charcoal has also a considerable absorbent capacity but it has the defect of being itself a combustible material and also of less elasticity of its particles which renders it easy to squeeze out a part of its nitro-glycerine.
The two materials are combined in the following manner:
The earth thoroughly dried and pulverised is placed in a wooden vessel. Then is introduced the nitro-glycerine in a steady stream so small that the two ingredients can be kept thoroughly mixed. The mixing maybe effected by the naked hand or by any proper wooden instrument used in the hand or by wooden machinery.
Sufficient of nitro-glycerine should be used to render the compound explosive but not so much as to change its form of powder to a liquid or pasty consistency.
Practically about sixty parts by weight of nitro-glycerine to forty of earth forms the useful minimum and seventy-eight parts by weight of nitro-glycerine to twenty-two of earth the useful maximum of explosive power. The former has a perfectly dry appearance, the latter is pasty. -
Between these two extremes the composition will be explosive powder and it will be more easily exploded and its explosive power greater as the relative proportion of the nitro-glycerine is greater.
When the mass has been optimely mixed and thoroughly incorporated by stirring and kneading it is rubbed through a hair silk or brass-wire sieve (iron corrodes) and any lumps which may remain are rubbed with a stiff-bristle brush till they are reduced and made to pass through the sieve.
The powder is then finished and ready for use.
The chief characteristic of this powder is its nearly perfect exemption from liability to accidental or involuntary explosion: -
It is far less sensitive than nitro-glycerine to concussion or percussion and contained in its usual packing (a wooden cask or box) the latter may be smashed completely to pieces without any

danger of an explosion.

Unlike gunpowder in the open air or in ordinary packing (a wooden cask or box) it burns up when set fire to without exploding. It can therefore be handled; stored and transported with less danger than ordinary gunpowder.

When confided in a tight and strong enclosure it explodes by heat applied in any form. Under all other circumstances it may be exploded by some other explosion in it or into it.

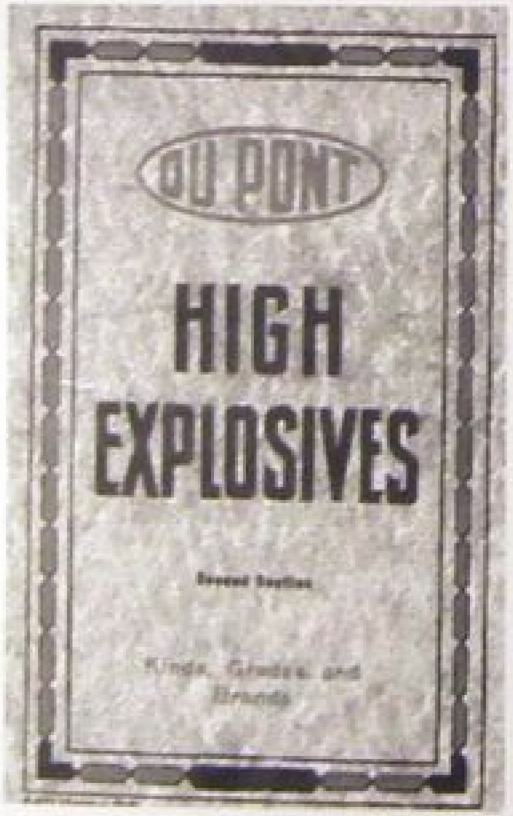
The most simple and certain method known to me of exploding it is as follows:

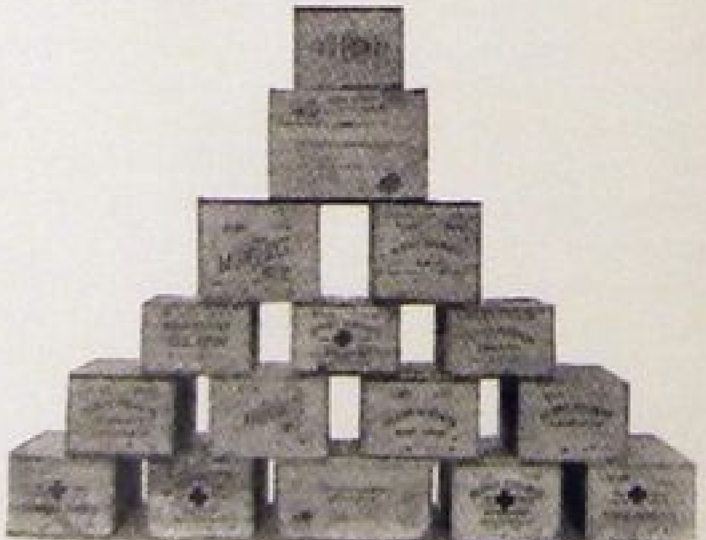
The end of a common blasting-fuse is inserted into a percussion-cap and the rim of the cap crimped tightly and firmly about the fuse by nippers or other means se as to leave the fulminating-powder of the cap and th end of the fuse tightly and firmly enclosed together. The end of the fuse with the cap attached; is then embedded in the powder-the more firmly the more certain the explosion.

In blasting the powder is pressed tightly about the cap and fuse and tamping of sand or other proper material added and pressed but not pounded in. The fuse explodes the cap and this explosion explodes the powder.

As before stated the more strongly the powder is charged with nitro-glycerine the more easily it explodes. If therefore the powder contains a low proportion of nitro-glycerine it is necessary to employ in its explosion a correspondingly long strong and heavily-charged percussion-cap made especially for the purpose. For the sake of certainty of explosion it is better to use such a cap in all cases.

If the fire from the fuse comes in contact with the powder before the cap is exploded which is liable to occur if the fuse is leaky and the cap extends too far into the powder a portion of the ponder will be burned before the explosion takes place.. To guard against this the cap should only he fairly inserted into the powder and poor fuses wound next to the cap firmly with strong glued paper or hemp or otherwise secured.






DU PONT STRAIGHT

DU PONT EXTRA

RED CROSS STRAIGHT


RED CROSS FARM POWDER

Red Cross Farm Powder is an explosive designed especially for scientific agriculture, especially for tree planting, subsoiling, ditching by the electrical method and ordinary stump blasting. It is an ideal all-round explosive for use on a farm. It is low freezing.

RED CROSS STUMPING POWDER

Red Cross Stumping Powder is similar to Red Cross Farm Powder, but is quicker and stronger and intended for boulder blasting and stumping in lighter, less resisting soil. It is low freezing.

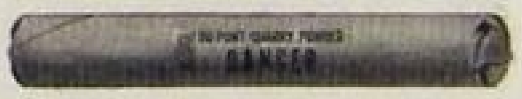
DU PONT STUMPING POWDER

A low-freezing dynamite especially adapted to stumping requirements on the West Coast. It does not stand water well, hence cartridges should not

REPAUNO STUMPING

An explosive similar to Du Pont Stumping for West Coast requirements, and having somewhat the same general characteristics. It is low freezing.

DU PONT QUARRY POWDER (Low Freezing)



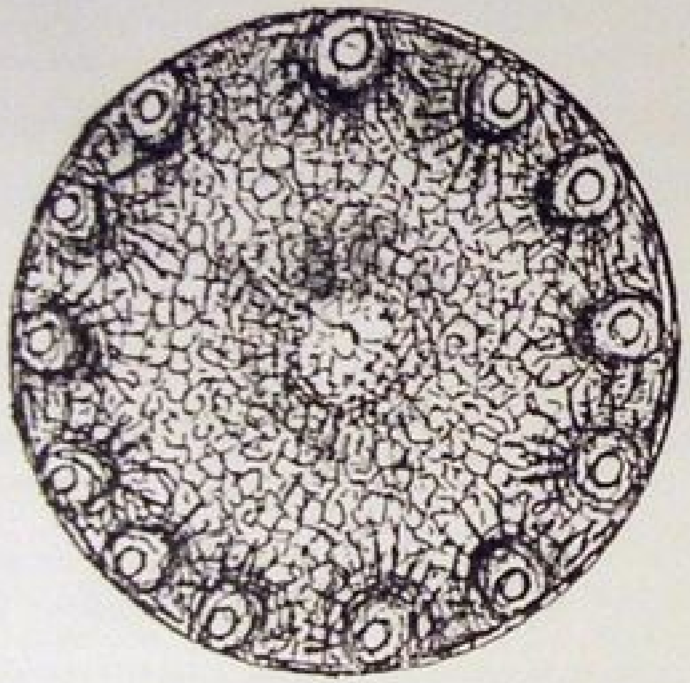
This is a new explosive produced to meet the demand for a powerful, quick-acting explosive for open work only. In the great majority of open quarry work requiring the use of high explosives, this powder will be found satisfactory for springing, well-drill hole blasting, ordinary drill holes, block hole and plug hole shooting, mudcapping, 'dobying and blistering.

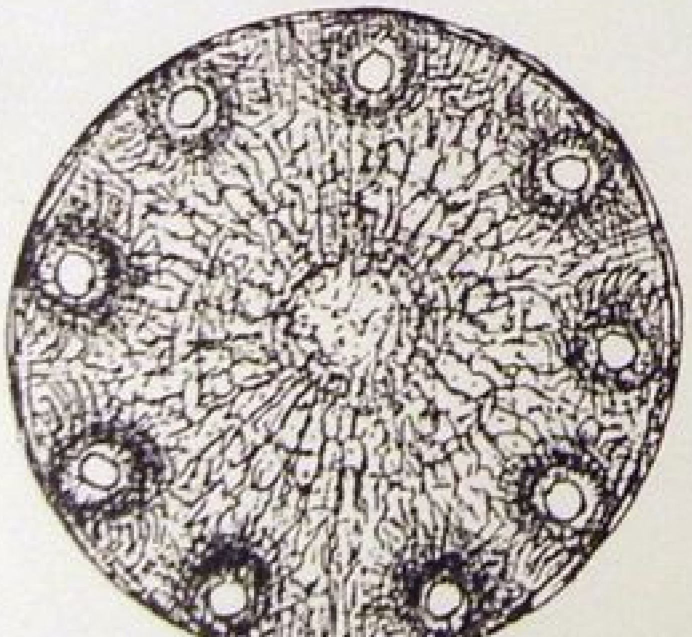
DU PONT R. R. P.

This is a black, granular, free-running explosive packed in paraffine paper bags containing 12½ pounds each, and packed four bags to the 50-pound case. It is low freezing and requires no thawing except when long exposed to severe

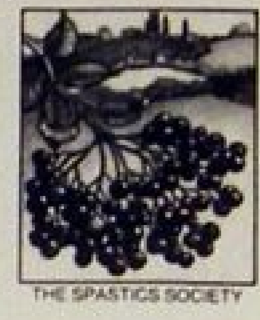
A Christmas Card - by Norman Ingram Hendey

Following my meeting with Norman and his permission to use some of his work in the pages of The Amateur Diatomist I can think of no better way to do so than reproduce one of his Christmas cards. Originally sent for Xmas 1985.





Season's Greetings



To wish you a Happy Christmas
&
a Prosperous New Year for
1985

Bermuda Rise

An Eocene fossil diatom

Kindest Regards
Norman & Nellie

Glomar Challenger JOIDES

Field Microscopes (VI)
Russian Portables

The following two models are not strictly field microscopes, unless you have a string of pack animals at your disposal. However, I have used the MBD model 'in the field' so to speak when I have been camping. It is no less a field microscope than the Wild M11 featured in an earlier issue.

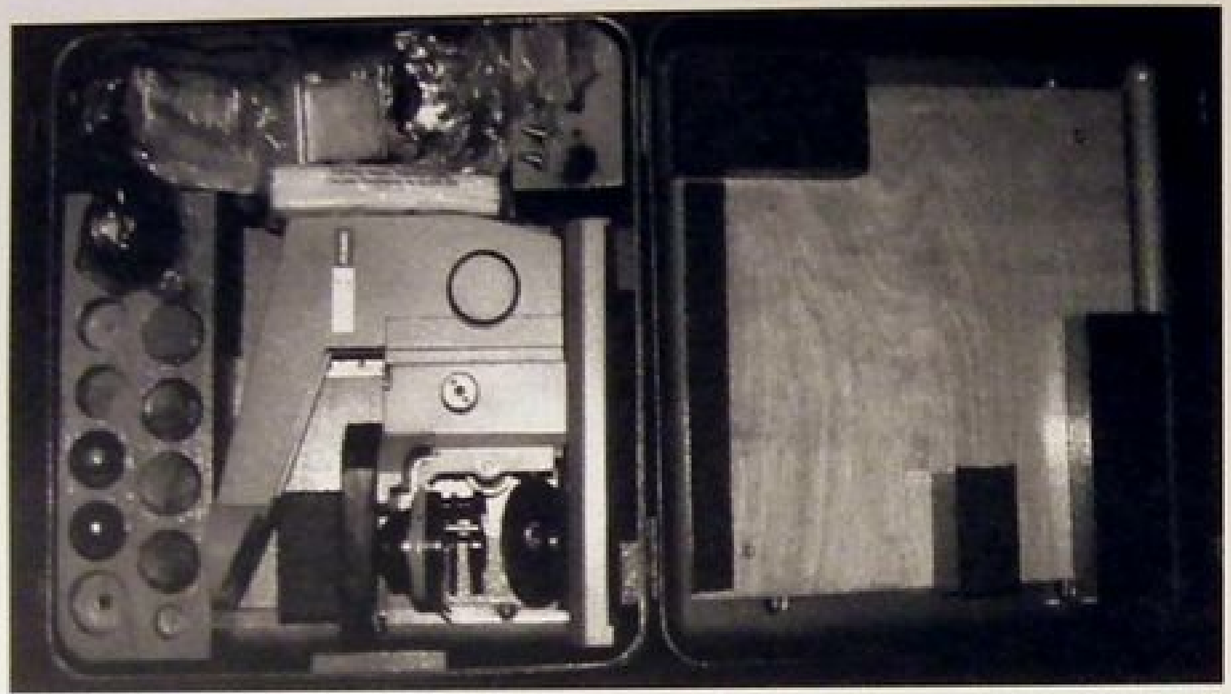
These Russian microscopes are sometimes looked upon with disdain, which I believe is completely unwarranted. Their design is based loosely on a Zeiss design. The Russians mass produced these stands and hence they became available at a very reasonable price and even today the 'Biolam' models can be had for very little money indeed. Their main fault, in my experience, is for the fine focus to stick. However, the maintenance of these stands is so simple that this minor fault can be rectified quickly and easily. Like my old Morris Minor, most parts from similar models can be interchanged without too much difficulty.

It has to be admitted that the portable stands are somewhat less easy to come by but since the standard models are so easy to assemble/disassemble and good photography boxes are cheap, a portable stand can be created quite quickly.

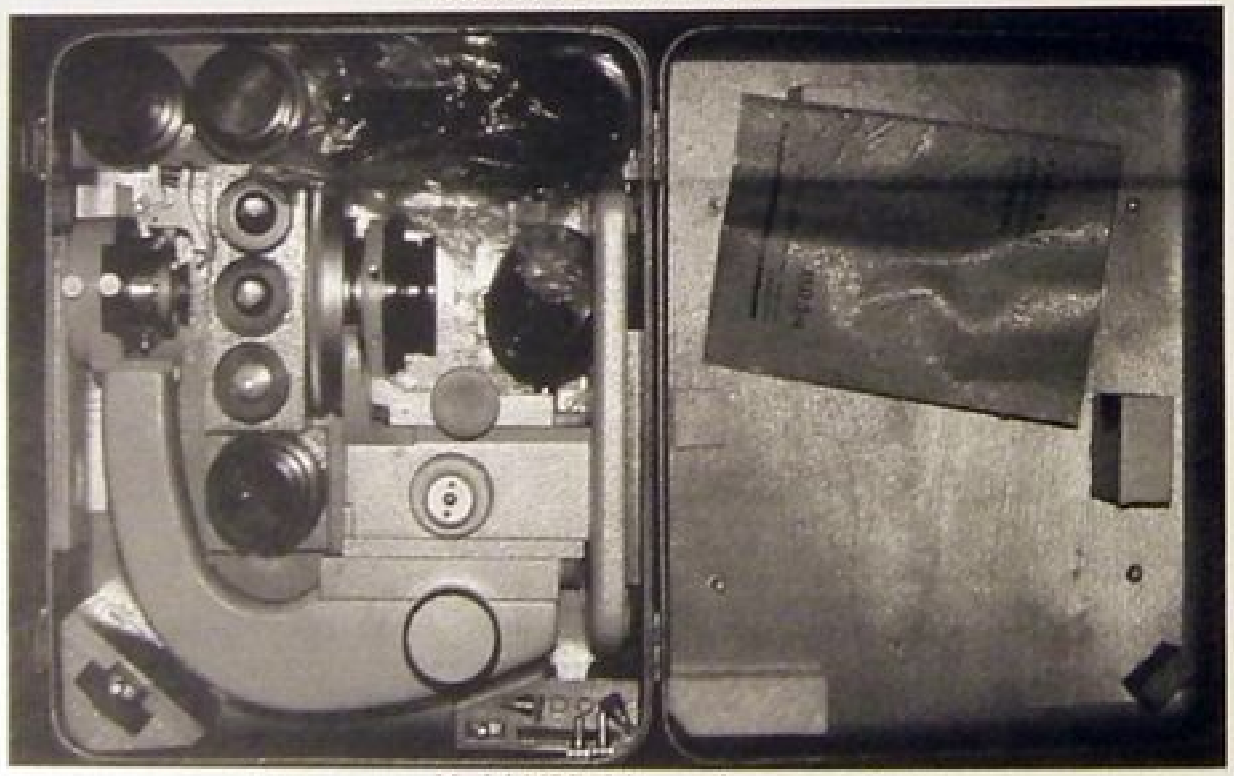
The Russian optics are good and serviceable, not outstanding but pretty good. I haven't come across a delaminated objective yet, which is more than I can say for some of the Zeiss optics.

If you want a full blown biological (or petrological) microscope in the field then you could do a lot worse than sourcing one of these instruments.

They or their brethren often turn up for sale at Microscopical Society meetings in the UK.



Model MBD-1 in metal case

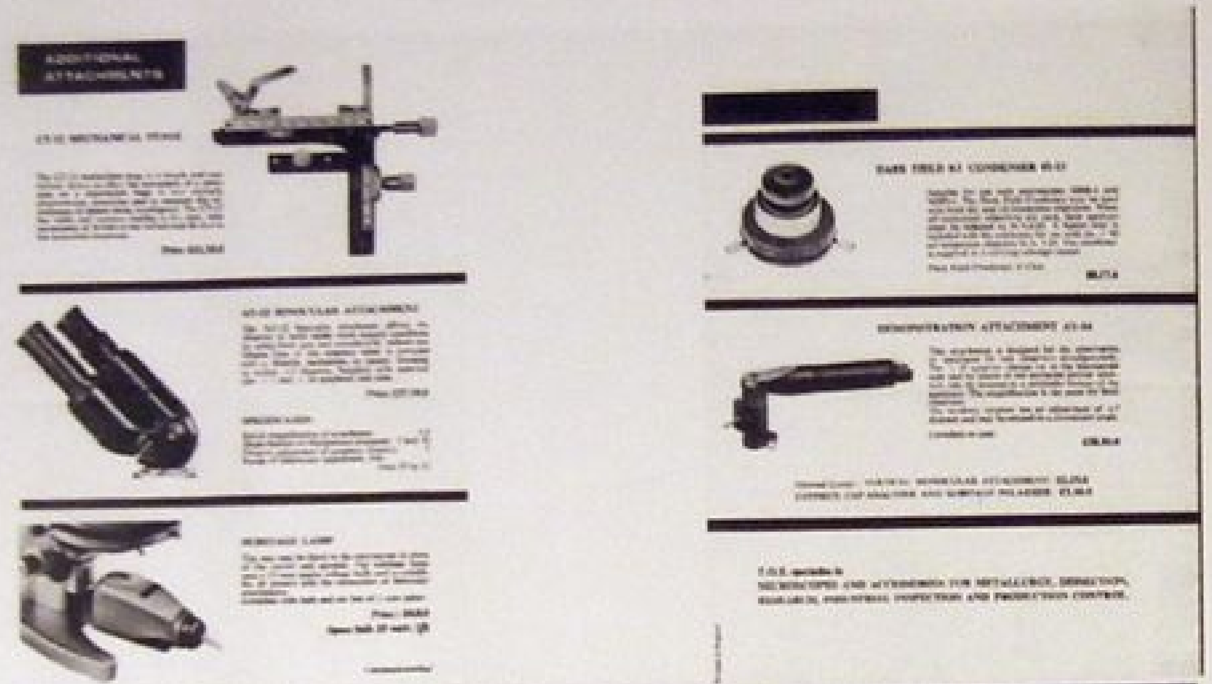


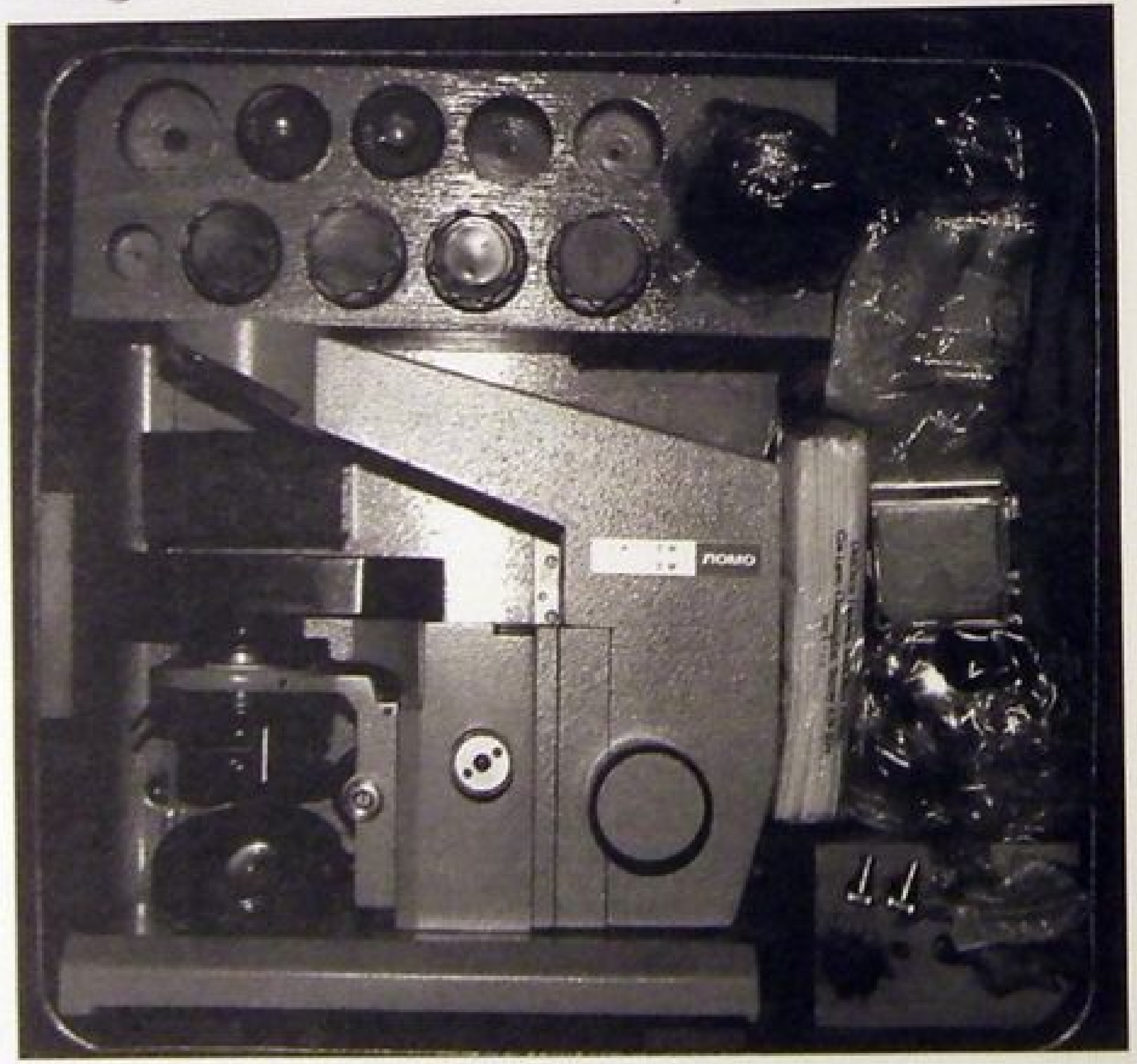
Model MPD-1 in metal case

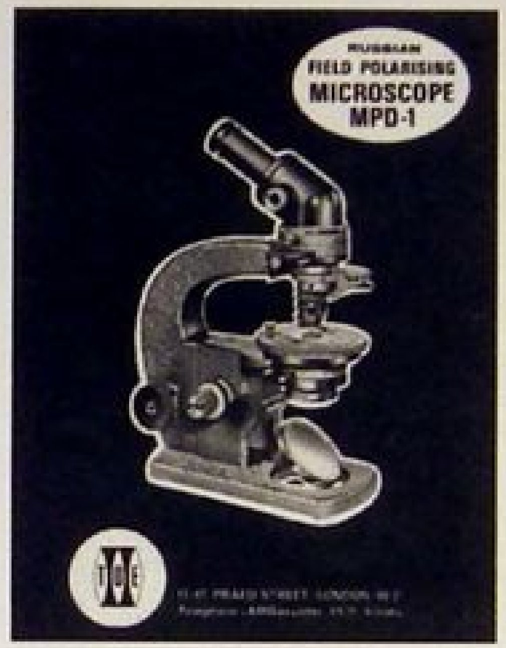
As can be seen the stands pack away into their original metal cases very neatly and anyone wishing to adapt a camera case to take one of the standard models would be well advised to follow the arrangements made in the original.

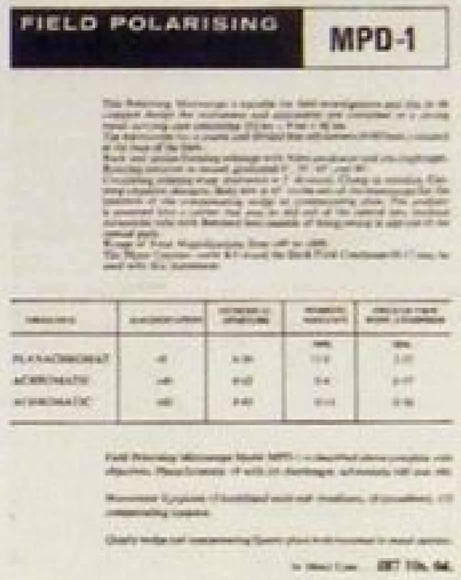
Not a lot of space is wasted.

The next two images provide a little more detail.









Klamath Falls, Oregon

Photographs courtesy of Stephen Nagy

I don't know about everyone else but whenever I read a label on a slide, the placename conjures up a quite specific image related to the name. Such a placename is Klamath Falls, Oregon (sometimes written Klammath Falls). Perhaps I watched too many Westerns when I was young but Oregon I'm sure was either the start or end point for a famous cattle herding trail. A place of sweeping plains and wide vistas.

Klammath Falls, therefore, must be a point on a river basin where ancient movements of the earths crust have caused the river bed to subside leaving the upper reaches cascading over the remaining lip into the river below. This cascade will be high and flanked on either side by tall spruce. The constant erosion by the water will have exposed layers from an ancient lake-bed, diatomite.

Indeed when you read geological surveys of the area this might not seem far from the truth - at least some elements anyway.

The Klamath Groundwater Basin Bulletin (118) provides some salient geological information.

"Thickness of the lake deposits is unknown. Well yields are generally low. Upper Pliocene Diatomite. Deposits of diatomite are prominently exposed at the surface in the southwestern portion of the subbasin. These gray to white deposits often include interbedded sand, tuff breccia, and volcanic ash. The diatomite is essentially non-water-bearing and commonly serves as a confining layer; however, some yields may be obtained from wells developed in the interbedded deposits. Pliocene Continental Sediments. These sediments consist of clay, diatomaceous earth and interbedded fluvial deposits of unknown thickness that overlap volcanic rocks of Miocene and Pliocene age but their exact relation in the subsurface is unknown. These sediments may locally include the Upper Pliocene diatomite deposits. They are probably of low to moderate permeability and may locally act as a confining layer. "

However, a couple of photographs sent by our regular contributor Stephen Nagy made me think again. A review of the history of the place is quite interesting.

The movement West via the Oregon Trail was the cue for the estabilishment of a settlement in the Klamath Basin. A town named Linkville was built at the mouth of the Link River by one George Nurse in 1867. In 1893 the name was changed to Klamath Falls and ultimately became the City of Klamath Falls in 1905. Klamath Falls was renowned for its forests and range but the region was too remote for it to became an economic force. The Southern Pacific Railroad arrived in Klamath Falls in 1909 when its future became secured. In the 1920's Klamath Falls was the fastest growing City in Oregon. The City continued to expand until the Great Depression of 1929 when the timber boom came to an abrupt halt.

The City is situate in the southern central region of Oregon and borders northern California. Klamath Falls was estabilished on the south shore of Upper Klamath Lake, within the Klamath Basin sheltered by the Eastern slopes of the Cascade Mountains.

Diatom philately

This is the only stamp we have seen bearing images of diatoms.

Classic Texts

This text was published in 1854 as Lecture IV - Skeleton of Diatomaceae - of the Lectures in Histology Vol. II - Structure of the Skeleton of Plants and Invertebrate Animals - by John Quekett. It contains some interesting observations and particularly a reference to the use of Hydrofluoric Acid to process diatoms. This process will be the subject of an article in a later edition.

The following reproductions of the relevant pages are of the entire Lecture IV. Some references to the Diatomaceae appear in other sections but mostly as references to the text reproduced in Lecture IV.

LECTURE IV.

SKELETON OF DIATOMACEÆ.

Having in the last Lecture made a few remarks upon the *Desmidieæ* and *Diatomaceæ*, and the probable nature of the markings on the surfaces of the latter, I now proceed to consider the mode in which the silica and organic matter in the individual specimens, or frustules as they are termed by the botanist, are disposed.

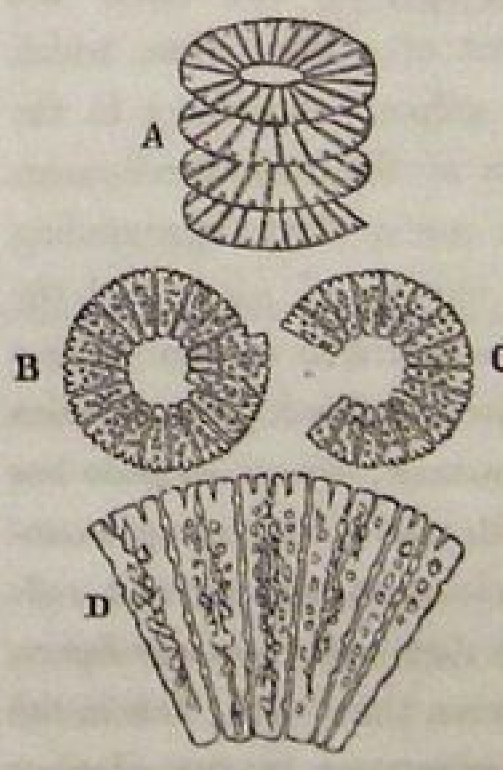
Each frustule may be regarded as a cell, in which, occasionally, a nucleus and nucleolus are contained. By boiling in nitric acid, or by the action of fire, all the organic matter will be removed, and the silica left; but if hydrofluoric acid be employed instead of nitric, as was first done by Professor Baily, the silica will be dissolved, and a flexible internal membrane, probably composed of the same horn-like material as the skeleton of the *Desmidieæ*, will remain, retaining the general form of the frustule, even to the delicate markings. It is this organic structure that selects the silica from the water, and deposits it as a thin film upon its external surface. In the young state, each furstule consists of two valves, investing a closed membranous sac or cell, within which are contained a mucilaginous fluid, and minute coloured granules, constituting the endochrome; as the frustule increases in age, the two valves are separated by the development of a third plate, which forms a band between the valves. According to the Rev. W. Smith,* no portion of the internal cell-membrane can be exposed to the action of the surrounding water without secreting a coating of silica, and the moment the valves become separated in the process of self-division, the secretion of a third plate of silica in the form of a band, commences; this third plate has been termed by Mr. Smith the "connecting membrane." The water is admitted to the internal cell-membrane, in many species that are of circular figure, along the line of suture between the valves; but in the elongated forms through perforations in the siliceous envelope, situated generally at the extremities: none of the other markings, however large, being perforations.

Some of the simplest of the Diatomaceæ are those which still retain the generic name of *Diatoma;* of these one, *D. flocculosum*, represented at F, in

* British Diatomaceæ, p. 14.

Fig. 24, occurs in considerable abundance in the form of zig-zag chains: each frustule consisting of a quadrangular plate, having its middle and two outer edges thicker than the other parts, so that in section, or when viewed end-ways, it presents the appearance shown at *f*. Other species of this genus vary considerably in shape, one in particular has frustules much longer than they are broad, and is consequently named *D. elongatum*. A very interesting and beautiful species of *Diatoma* is the *Meridion circulare*, which in the fresh state consists of a series of wedge-shaped frustules, as shown at D, Fig. 22, arranged in the form of circular bands, as at C; these, however, are not flat, but when perfect, as represented at B, have one end raised above the other; a better view, however, is obtained when the chains are thrown on one edge, they then present the flattened screw-like form represented by A. This species is met with in tolerable abundance in England and, also, according to Professor Bailey, "occurs in immense quantities in the mountain brooks around

FIG. 22.



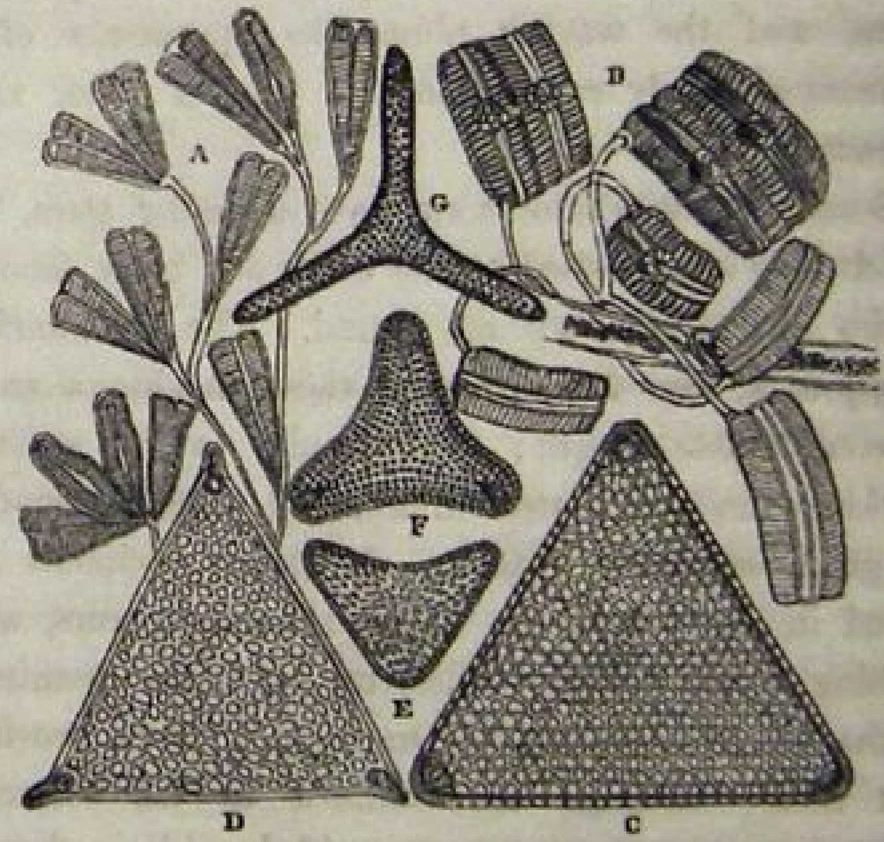
A, frustules of *Meridion circulare* seen edgeways. B C, frustules disposed in a circular form. D, five frustules more highly magnified.

West Point, the bottoms of which are literally covered in the first warm days of spring with a ferruginous coloured, mucous matter, about $\frac{1}{4}$ of an inch thick, which, on examination by the microscope, proves to be filled with millions and millions of these exquisitely beautiful siliceous bodies. Every submerged stone, twig, and spear of grass is enveloped by them, and the waving plume-like appearance of a filamentous body covered in this way is often very elegant."

Some of the Diatomaceæ have a horny stem, by which they are attached to the weeds and other foreign bodies on which they are found. The *Achnanthes longipes*, A, Fig. 23, is one of these, having a stem of considerable length; the frustules exhibit striated markings on their outer surface, and contain granules of green colouring matter. If these specimens be boiled in nitric acid the horny stem disappears, and nothing is left but the silica, on which the markings of the loricæ or valves, are more plainly seen, proving that these markings are confined to the siliceous skeleton. Another species provided with a horny branching stem, the *Gomphonema geminatum*, is represented at B, in Fig. 23; some of the frustules are there shown with the front of their valves towards the eye, whilst of the majority only a side view is exhibited. The siliceous skeletons of Diatomaceæ being indestructible, are very frequently found in the mud of ponds and rivers; that of the

Thames contains large quantities of them, and amongst the number, a peculiar shell is occasionally found, which, from having a horn-like process at each angle, has been named *Triceratium favus*. At C, in Fig. 23, is represented one of the valves,

FIG. 23.

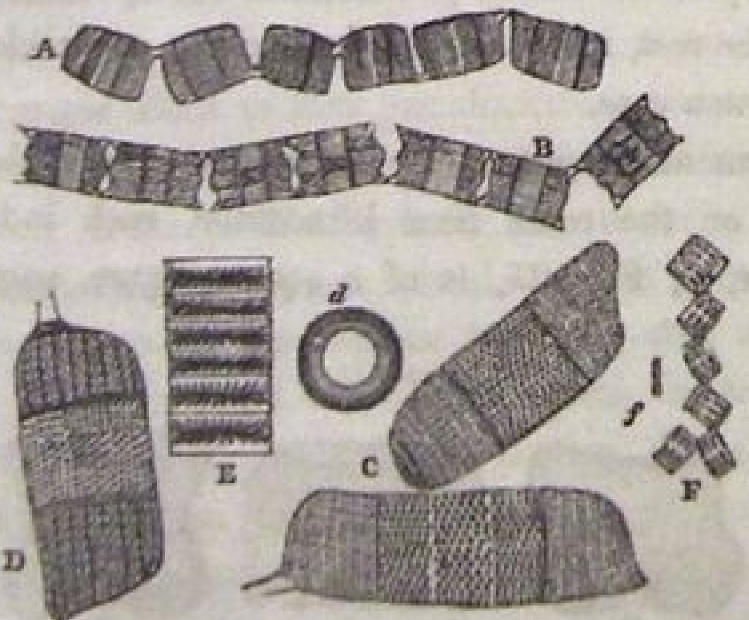


A, *Achnanthes longipes*. B, *Gomphonema geminatum*. C, a single valve of *Triceratium favus*. D, E, F, G, fossil *Triceratia* from Bermuda.

there being two such, which are separated from each other by an intermediate valve, this species of *Triceratium* is of triangular form, and appears to be made up of equal-sized hexagonal cells, like those of vegetable tissue. A great variety of *Triceratia* occur in the infusorial earth from Bermuda, some of the principal forms of the valves of which, are represented at D, E, F, G, in Fig. 23, and a great number of others are described by Mr. Brightwell, in the first volume of the "Quarterly Journal of Microscopical Science," the true figure of each being correctly delineated.

The genus *Isthmia* is of very peculiar form, consisting of two apparently distinct bodies united by a narrow portion, whence the name. There are two species commonly met with on our coasts, the *I. enervis* and *I. obliquata*, they are generally found attached to portions of sea-weed; some of the individuals being single, whilst others are connected by means of a short pedicle, coming off from one of the corners, so as to

FIG. 24.



A, *Amphitetras antediluviana.* B, *Biddulphia quinquelocularis.* C, *Isthmia enervis.* D, *Isthmia obliquata.* E, *Gallionella sulcata;* d, detached joint of the same. F, *Diatoma flocculosum;* f, end view of frustule.

form a zig-zag chain, the surfaces of all the specimens of *I. enervis*, are covered with hexagonal markings, and two transverse lines, or bands, divide each into three parts. They are propagated by the separation of the terminal portions from the body, each becoming a distinct individual, whilst the body forms the case in which they are contained, as shown at C, in Fig. 24. The other species of *Isthmia*, the *I. obliquata*, Fig. 24, D, is rather broader and larger than the preceding, and is also divided into three parts by two transverse bands, the terminal portions being strengthened by a row of parallel ribs, which are placed in the direction of the long axis of the specimen, and are somewhat raised above the general surface. The mode of increase is precisely similar to that of *Isthmia enervis*, and in the preparation before you there is one specimen larger than the rest, in which two individuals are enclosed in a common case.

In an allied genus, the *Amphitetras antediluviana*, found on the coast near Ilfracombe, each individual frustule, A, Fig. 25, is of a square figure, somewhat

FIG. 25.

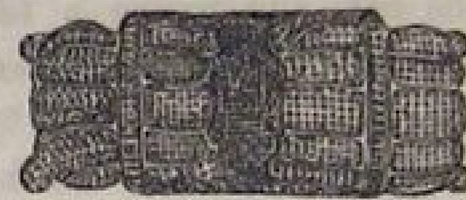
Amphitetras antediluviana entire. B, C, upper and under surface of the two lateral portions.

resembling a box, and like the *Isthmia* consisting of three portions, the terminal ones, B, C, composing the top and bottom of the box, and having a triangular spot or hole, at each of the four corners. In the recent state, the frustules are connected by means of a pedicle developed from one of the corners, so that it is usual to find long chains of them, like those represented at A, in Fig. 24. In the interior of each frustule, in the living condition, a number of green granules are observed, but there is little or no trace of markings on their exterior, if the specimen, however, be boiled in nitric acid the siliceous framework will be found entirely covered with hexagonal markings; some of the frustules remain perfect, others are separated into three parts, the top and bottom being alike, as shown at B, C, and the central piece resembling a box without the ends.

In a genus allied to that just described, *Biddulphia*, each frustule consists of three portions, the central one being more or less square, and those at each end, which may be termed lateral, having either one or three rounded projections between the angles, which do not equal the lateral parts in length; from the sides of the central portion, large striæ or ribs proceed as far as the margins of the projections, but in some cases the striæ are divergent, in others united by anastomosing lines. The entire surface of each specimen is covered with rounded projections or dots, which, as in *Isthmia*, are smaller in

the central than in the lateral portions. Two specimens of *Biddulphia pulchella*, enclosed in the same case, are represented in Fig. 26; when young, and in the recent state, the frustules are attached to each other by the angles, but occasionally they cohere by the alternate angles only, and thus form a zig-zag chain, as shown by *Biddulphia quinquelocularis*, Fig. 24, B.

FIG. 26.

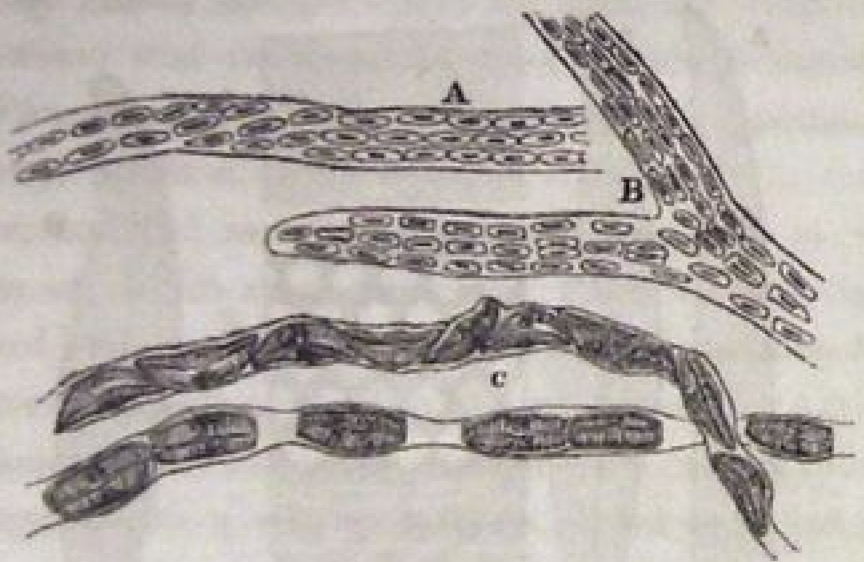


Two frustules of *Biddulphia pulchella* enclosed in a common case.

All the specimens of Diatomaceæ described in this and the preceding Lecture have the frustules naked, that is, according to the Rev. W. Smith, not imbedded in gelatine, nor enclosed in membranaceous tubes; but for the sake of contrast, three species must be briefly noticed in which the frustules are invested with a gelatinous or membranous envelope, these being represented in Fig. 27. At A is shown a specimen of *Schizonema rutilans*, at B one of *S. Ehrenbergii*, both having a transparent envelope, through which the individual frustules may be seen; the frustules, however, may be more plainly recognized in *Encyonema paradoxum*, figured at C.

The Diatomaceæ are the most widely distributed of any of the classes of organized beings, and although minute, contribute not a little to the formation of certain of the strata of our planet, generation succeeding generation, each in its turn adding its siliceous skeletons to the common heap. They are very abundant on the weeds of our ponds and rivers, and especially in summer in the

FIG. 27.

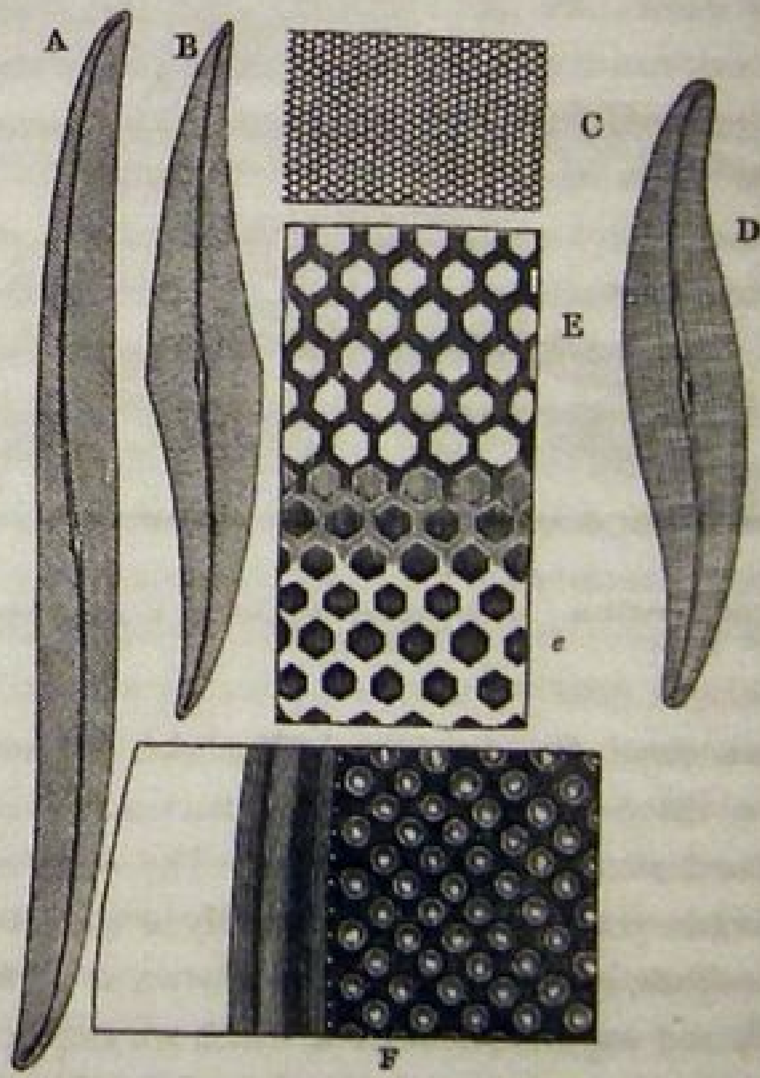


A, *Schizonema rutilans*. B, *Schizonema Ehrenbergii*. C, *Encyonema paradoxum*.

marshes about Greenwich and Woolwich, where they form a slimy or muddy layer on the surface of the leaves and stems of aquatic plants. The mass on the table before you consists almost entirely of specimens of *Pleurosigma*, especially the species known as *P. hippocampus* and *angulatum*, both of which are employed by opticians and amateurs, as tests of the defining power of their object-glasses. In the fresh state very few of the beautiful markings that exist on their surfaces can be distinguished, but if they be dried, or subjected to the action of boiling nitric acid, the organic matter is removed, and the markings can then be well brought

out by careful manipulation. In Fig. 28, three of the species of *Pleurosigma*, most commonly used as tests,

FIG. 28.



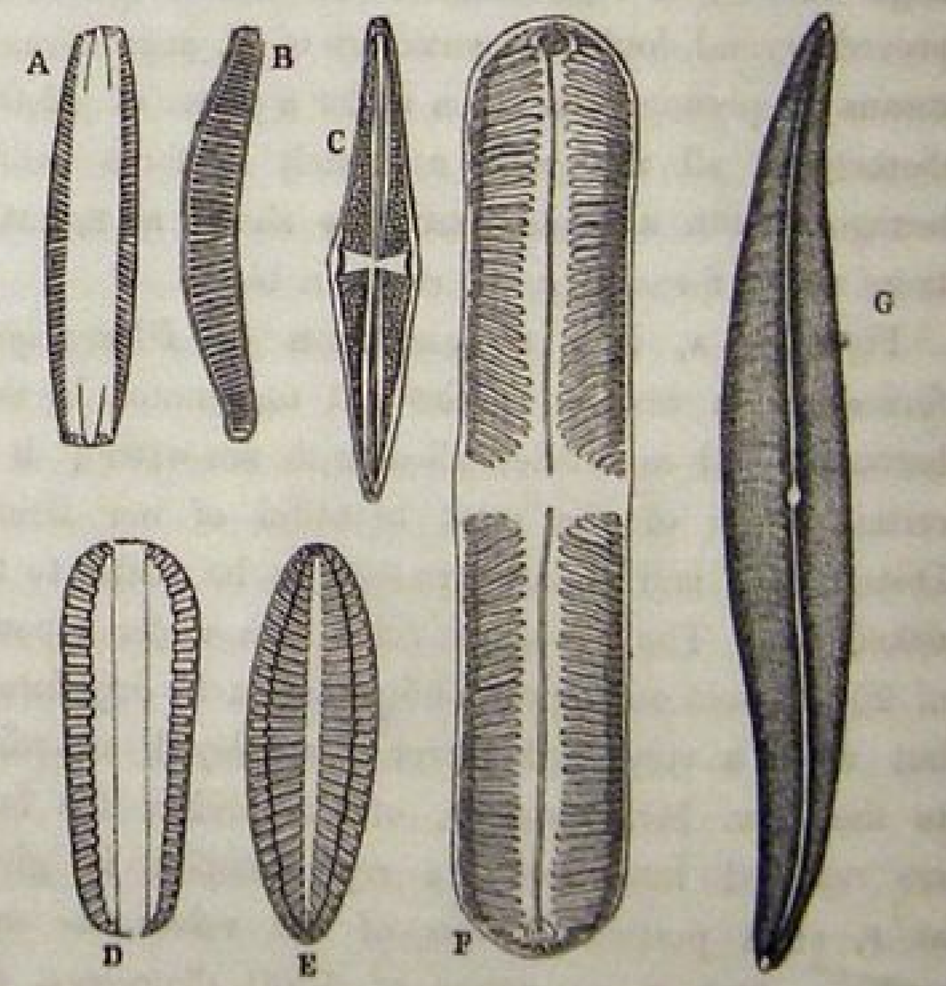
A, *Pleurosigma formosum*. B, *P. angulatum*. C, portion of the same magnified 1300 diameters. D, *P. hippocampus*. E, portion of *P. angulatum* magnified 15,000 diameters, showing at E a part in focus, and at *e* a part out of focus. F, portion of *P. formosum* magnified 5500 diameters.

are exhibited; that at A, being *P. formosum*, at B, *P. angulatum*, and at D, *P. hippocampus*. A representation of the markings of *Pleurosigma angulatum*, as seen with the $\frac{1}{12}$th of an inch object-glass by Mr. Wenham, is given at C; in certain states of the focus the valve appears covered with oblique lines, but by careful management of the light, Mr. Wenham has found that these can be resolved into hexagons. In *Pleurosigma hippocampus* the same lined appearance is seen, the lines, however, are at right angles to each other, and not as in *P. angulatum*, arranged at an angle of 60°, as represented at B. Mr. Wenham has proved beyond doubt the structure of *P. angulatum* by means of photographs taken under a power of 15,000 diameters; all the parts accurately in focus exhibit hexagons with a white centre, as shown at E, but in those out of focus, at *e*, the centre is black.

Fig. 28, A, is a representation of *Pleurosigma formosum*, a marine species not uncommon in tidal harbours, and in ditches filled with sea-water; it is certainly one of the most beautiful of our British Diatomaceæ, and is large enough to be visible to the naked eye. The markings when seen under a power of 250 diameters, appear oblique, as in *P. angulatum*, but when a very high power is employed, according to the Rev. Mr. Kingsley, of Cambridge, the lines are resolved into dots; a representation is given at F, of a portion of one of the valves, as seen under a magnifying power of 5500 diameters, the markings being resolved into so many studs or beads; but notwithstanding the enormous power employed

on this occasion there are many observers who still regard these markings as depressions, and not as elevations. An American species of *Pleurosigma*, *P. Spencerii*, a few years since was employed as a test object, it has been carefully examined by Mr. Warren de la Rue, and its markings were by him first resolved into dots; the representation given at G, in Fig. 29, is from that gentleman's drawing, a species allied to it is found in this country.

FIG. 29



A, B, front and side view of *Eunotia arcus*. C, *Navicula*, from New Zealand. D, E, front and side view of *Navicula striatula*. F, *Pinnularia Cardinalis*. *Navicula*, now *Pleurosigma Spencerii*.

There are some *Naviculæ*, D, E and F, in Fig. 29, that have striæ in the form of ribs or costæ, which cannot be resolved into dots; to one of these F the generic name of *Pinnularia* has been applied by the Rev. W. Smith, the species figured being named *Cardinalis*; other species of *Navicula* and *Pleurosigma*, sometimes occur, on which the markings are so delicate that they may almost be said to defy every object-glass hitherto constructed; but if opticians progress in the wonderful way they have done within the last five years, we may hope that at some future time the markings of even the most difficult species will be readily resolved.

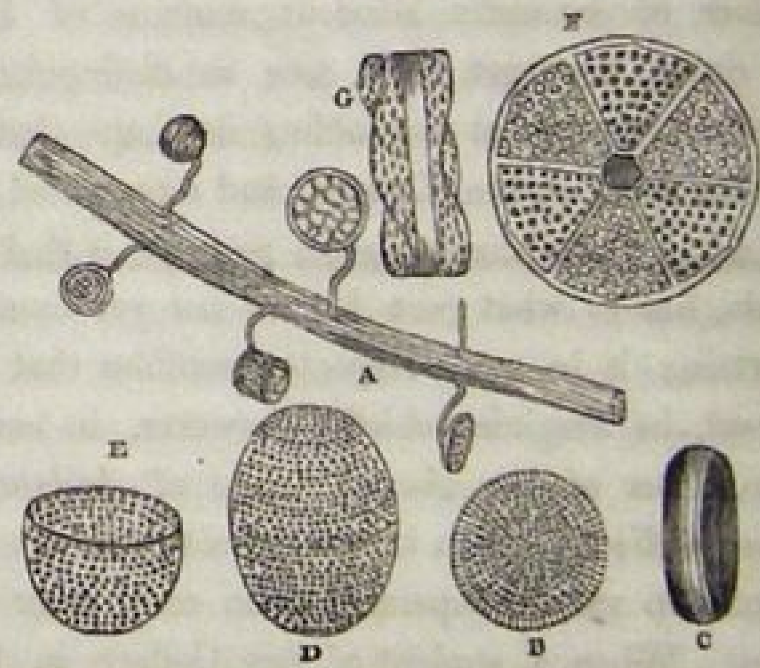
From the skeletons of Diatomaceæ still found in a living state, I shall proceed to describe a few of those which existed in ages long antecedent to the creation of man, and which from their abundance constitute no unimportant part of some of the strata of the crust of our globe. We are told by Professor Rogers that at and near the city of Richmond, in Virginia, there is a stratum twenty miles in length and several feet in depth, composed almost entirely of fossil Diatomaceæ. This earth, which was first sent to England by Professor Bailey, of West Point, New York, has been carefully examined by that gentleman, and an account of some of the interesting forms found in it has been published in the "American Journal of Science," Vol. XLII. Amongst these Diatomaceæ are several species of the genera *Actinocyclus* and *Coscinodiscus*,

both being circular and remarkable for the beauty of their markings. *Gallionella sulcata*, also occurs abundantly in this earth; it has the form of a long jointed cylinder, Fig. 24, E, one of the joints being represented at *d*. In other parts of America, as for instance, at Petersburg, in Virginia, and Piscataway, in Maryland, infusorial earths are met with in which Diatomaceæ of singular beauty abound; these also have been described by Professor Bailey in the work quoted above. The *Eunotia arcus*, represented at A, B, in Fig. 29, is found in both these deposits.

Most of the fossil infusorial earths are employed in the arts for the polishing of metals, as for example, Tripoli, and the polishing-powder of Bilin, in Bohemia; this last occurs in a series of beds, averaging fourteen feet in thickness, and is almost entirely composed of the remains of Diatomaceæ, which are supposed to have been subjected at some time to the action of a high temperature. The well-known Turkey-stone, so celebrated for the sharpening of the hardest edge tools, is partly made up of infusorial remains; the pavement of the quadrangle of the Royal Exchange is composed of this mineral. The Rotten-stone of commerce, another polishing material, consists principally of the remains of Diatomaceæ; and in Ireland, in the county of Down, on the banks of the River Upper Bann, there is a white deposit, formed almost entirely of the siliceous loricæ of Bacillariæ, amongst which are joints of a small *Gallionella*, Fig. 42, F, and peculiar circular loricæ, exhibiting a radiated structure as represented at E. The *berg-mehl*, or mountain meal of Sweden and Lapland, washed down by the mountain torrents, and which from its lightness and resemblance to flour is employed in times of great scarcity by the poor, mixed with that article of diet, is composed of little else than pure silica, existing in the form of skeletons of Diatomaceæ. A polishing slate is found in Jutland, in which a number of beautiful siliceous remains of Diatomaceæ occur, amongst them may be distinguished a *Triceratium*, somewhat resembling in shape that met with in the mud of the Thames, and represented by F, in Fig. 41. The richest deposit, perhaps, is that from Bermuda, but in what part I have not yet been able to ascertain; it in some respects resembles that from Richmond, in Virginia, chiefly, however, in containing specimens of the discoid loricæ of *Actinocyclus* and *Coscinodiscus* which in the recent state are composed of two valves, separated from each other by a thin rim. When a student of this College, in 1841, I found many small species of these loricæ attached to Zoophytes, which had been brought home in spirit from Melville Island, in the Arctic regions, by Captain, now Sir Edward Parry. In the sediment at the bottom of the bottle, I discovered no less than thirty-four varieties of Diatomaceæ, some of which are represented in Fig. 30; and amongst them were certain species of *Coscinodiscus*, at that time only known as occurring in the

Richmond earth. There were, also, some small pieces of sea-weed in the sediment, and on these were found some minute bivalve, circular discs, of a brown colour, and of the shape shown at A, Fig. 30; they were attached to the sea-weed by means of a thin horny stem, and when treated with nitric acid, were found to be covered with delicate markings. *Coscinodiscus patina* represented in front view by B, and in side-

FIG. 30.



A, portion of sea-weed with discoid loricæ attached. B, front view of small *Coscinodiscus*. C, end view of the same. D, *Pyxidicula* entire. E, one valve of the same. F G, front and end view of *Actinocyclus undulatus*.

view by C, was not unfrequent in this sediment; the still more remarkable specimen probably of *Pyxidicula*, one valve of which is represented at E, and an entire one at D, also occurred in tolerable abundance. Professor Bailey has described this species as existing in the Richmond earth, and it is curious to observe, as will be seen by a paper of mine on this subject, published in the second volume of "The Microscopic Journal," how many species in this sediment are analogous to those found in a fossil state at Richmond, in Virginia. There is another stratum, discovered by Ehrenberg at Soos, near Eger in Bohemia, that consists almost entirely of the remarkable discoid forms, represented at B, C, Fig. 42, they are of an oval figure, curved twice in opposite directions, and from their resemblance to a shield, have been named by him *Campylodiscus clypeus;* when the learned Professor visited this country in 1841, he brought with him the first specimens that had been seen of this earth. The discs in almost every instance are very perfect, and in addition to their curious shapes, have markings worthy of notice.

An *Infusorial* stratum, discovered by Mr. Walter Mantell, the son of the late Dr. Mantell, at New Plymouth, in New Zealand, is remarkable for containing many species of *Naviculæ*, one of which, as shown at C in Fig. 29, has a central marking in the shape of a cross. Dr. Mantell told me that his son could procure no more of this deposit; being very light, it has been swept away by strong currents of wind, and distributed through all parts of the country, in the same way as we hear that showers of pollen, red snow, sand and even of shells and fish, have fallen in various parts of the globe, all having been taken up by currents of air, and carried in some instances many hundreds of miles, and then suddenly dropped as a

shower. Many instances are on record, in which, vessels sailing on the Atlantic, several hundred miles from land, have had their decks covered with sand an inch or more deep. Ehrenberg has examined many specimens of this sand, and has discovered that it is principally composed of the siliceous spicula of Sponges and of the skeletons of Diatomaceæ. He has given beautiful figures of most of the species in a paper entitled "Passat-Staub und Blut-Regen ein grosses organisches unsichtbares Wirken und Leben in der Atmosphäre," published in "The Transactions of the Prussian Academy of Sciences" for 1849.

Last, but not least in importance, is the substance known as *Guano;* it is composed principally of the excrement of sea-fowl, especially penguins, which return to roost in vast numbers upon the coast of Peru, as well as upon certain small islands in the Pacific; during the lapse of years, this substance has accumulated to so great an extent, that many thousand tons of it are annually imported into this country as manure; it contains a large quantity of ammonia, as may be readily known by the peculiar odour given off even from the smallest quantity.

The Guano obtained from the island of Ichaboe was examined microscopically by my late brother, Mr. Edwin Quekett, and in it he detected the siliceous remains of numerous Diatomaceæ, principally those of the discoid form. In a paper on this subject, read at one of the Meetings of the Microscopical Society, held in 1845, and published in the second volume of their "Transactions," he gives an account of the differences in character between the guano of Ichaboe and that of Peru, and how the former may be readily distinguished from the latter by the greater abundance of discoid skeletons. The mode of isolating these siliceous remains was only briefly alluded to by my brother, but very soon after the fact of their occurrence was made known, the method of obtaining them was rendered tolerably easy by a process contrived by Mr. Deane of Clapham, and published in the second volume of the work last quoted; it is copied nearly verbatim in my Treatise on the Microscope.

The probable cause of the presence of these remains in the Guano, appears to be that penguins feed chiefly on fish, and sometimes on shell-fish, these last it is well known, from the researches of the Rev. J. B. Reade, have always more or less sand in their stomachs, amongst which numerous Diatomaceæ occur; fish and birds both eat the shell-fish, and as the silica is not capable of digestion by the latter, it is voided with their excrement, and hence the source of these beautiful discs. It is a remarkable fact, that the first specimens of guano imported were the richest; many persons have examined large quantities of that sold in the shops without finding any siliceous remains whatever—no doubt in consequence of adulteration. The best Peruvian guano is, at present, imported by the house of Anthony Gibbs and Co.,

Lime Street, City, who have a contract for it with the Peruvian Government.

When we consider the vast amount of silica that must be taken from the soil by the straw of grasses of various kinds, it is possible that, besides the nitrogenous principles which guano contains, the silica in it, may also be of considerable service; it is certain that the cereal plants must take it up from the soil, for the atmosphere cannot supply it, and it could hardly be given to them in a more finely divided state: thus constituting another valuable quality of this material as a manure. The process of dissolving the silica and taking it up to be deposited in the tissues, as is done by the grasses, is probably an electrical one; and in a recent visit to Somersetshire, I witnessed the following most striking experiment in the laboratory of Mr. Crosse, a true philosopher, of whom doubtless you have heard as being so celebrated for his experiments in voltaic electricity.

In a common tumbler filled with distilled water were placed, on opposite sides, a portion of silver—if I recollect rightly, a sixpence—and a piece of slate; one was connected with the positive, the other with the negative pole of a voltaic battery, consisting of a copper vessel containing a solution of sulphate of copper, in which was placed a porous tube and a zinc rod, the tube being full of a solution of sugar; by this means slow electrical action was kept up, and the silver on the one side was actually dissolved by

SKELETON OF DIATOMACEÆ. 69

the water, carried across, and deposited in a crystalline form upon the slate on the opposite side of the tumbler; had a piece of flint occupied the place of the silver, the same effect, in all probability, would have been produced. It occurred to me immediately that it might be by electrical agency that the silica, lime, and other inorganic materials were dissolved and assimilated by plants.

Chemical Formulae and Names

Looking back over the last three volumes of AD, to tot up the number of spelling mistakes and grammatical errors, I have noticed that in the later issues we have slipped into printing chemical formulae and not associating them with common names. I apologise for this and to make amends we now include a list of chemical names with the associated formula and some common synonyms for a few. We will endeavour not to repeat this manner of presentation in the future, but if we do - you will at least have a ready list to hand.

Name	Synonyms	Formula
1-hydroxymethylpropane	2-methyl-1-propanol, fermentation Butyl alcohol, isobutanol, iso-butyl alcohol, isopropylcarbinol	$CH_3(CH_2)_3OH$
2-methyl-1-propanol	1-hydroxymethylpropane, fermentation Butyl alcohol, isobutanol, iso-butyl alcohol, isopropylcarbinol	$CH_3(CH_2)_3OH$
2-propanone	Acetone, Beta-ketopropene, Dimethyl ketone, Propan-2-one, Propanone	CH_3COCH_3
Acetic acid	Ethanoic acid, Ethylic acid, Methane carboxylic acid, Vinegar	$C_2H_4O_2$
Acetone	2-propanone, Beta-ketopropene, Dimethyl ketone, Propan-2-one, Propanone	CH_3COCH_3
Ammonia	Hydrogen nitride, Nitrosil, Sprit of Hartshorn, Vaporole	NH_3
Aqua	Dihydrogen monoxide, Hydrogen hydroxide, Hydroxic acid, Water	H_2O
Aqua forti	Nitric acid, Spirit of Nitre	HNO_3

Arsenic sulfide	Arsenic sulphide, Realgar	As_4S_4
Name	**Synonyms**	**Formula**
Arsenic sulphide	Arsenic sulfide, Realgar	As_4S_4
Benzene	Benzol	C_6H_6
Benzol	Benzene	C_6H_6
Beta-ketopropene	2-propanone, Acetone, Dimethyl ketone, Propan-2-one, Propanone	CH_3COCH_3
Calcium sulfate	Calcium sulphate, Gypsum, Plaster of Paris	$CaSO_4$
Calcium sulphate	Calcium sulfate, Gypsum, Plaster of Paris	$CaSO_4$
Carbolic acid	Phenol	C_6H_5OH
Caustic soda	Lye, Sodium hydroxide	$NaOH$
Chloral hydrate	Trichloroacetaldehyde monohydrate	$C_2HCl_3O\ H_2O$
Chloroform	Methyl trichloride, Trichloromethane	$CHCl_3$
Condy's crystals	Permanganate of potash, Potassium manganate(VII), Potassium permanganate	$KMnO_4$
Dihydrogen dioxide	Hydrogen dioxide, Hydrogen peroxide	H_2O_2
Dihydrogen monoxide	Aqua, Hydrogen hydroxide, Hydroxic acid, Water	H_2O
Dimethyl ketone	2-propanone, Acetone, Beta-ketopropene, Propan-2-one, Propanone	CH_3COCH_3
Ethanoic acid	Acetic acid, Ethylic acid, Methane carboxylic acid, Vinegar	$C_2H_4O_2$
Ethanol	Ethyl alcohol, Hydroxyethane	C_2H_6O
Ethyl alcohol	Ethanol, Hydroxyethane	C_2H_6O
Ethylic acid	Acetic acid, Ethanoic acid, Methane carboxylic acid, Vinegar	$C_2H_4O_2$
fermentation Butyl alcohol	1-hydroxymethylpropane, 2-methyl-1-propanol, isobutanol,iso-butyl alcohol, isopropylcarbinol	$CH_3(CH_2)_3OH$
Formaldehyde	(Formalin = 37% Formaldehyde)	HCHO
Formalin	(See also Formaldehyde)	HCHO
Glycerin(e)	Glycerine, Glycerol	$C_3H_8O_3$
Glycerol	Glycerin(e)	$C_3H_8O_3$
Gypsum	Calcum sulfate, Calcium sulphate, Plaster of Paris	$CaSO_4$
Hydrochloric acid	Muriatic acid	HCl
Hydrogen dioxide	Dihydrogen dioxide, Hydrogen peroxide	H_2O_2
Hydrogen hydroxide	Aqua, Dihydrogen monoxide, Hydroxic acid, Water	H_2O
Hydrogen nitride	Ammonia, Nitrosil, Sprit of Hartshorn, Vaporole	NH_3

Hydrogen peroxide	Dihydrogen dioxide, Hydrogen dioxide	H_2O_2
Name	**Synonyms**	**Formula**
Hydroxic acid	Aqua, Dihydrogen monoxide, Hydrogen hydroxide, Water	H_2O
Hydroxyethane	Ethanol, Ethyl alcohol	C_2H_6O
Iodine		I
Iodo-methane	Methyl iodide	CH_3I
isobutanol	1-hydroxymethylpropane, 2-methyl-1-propanol, fermentation Butyl alcohol, iso-butyl alcohol, isopropylcarbinol	$CH_3(CH_2)_3OH$
iso-butyl alcohol	1-hydroxymethylpropane, 2-methyl-1-propanol, fermentation butyl alcohol, isobutanol, isopropylcarbinol	$CH_3(CH_2)_3OH$
isopropylcarbinol	1-hydroxymethylpropane, 2-methyl-1-propanol, fermentation Butyl alcohol, isobutanol, iso-butyl alcohol	$CH_3(CH_2)_3OH$
Kalium iodide	Knollide, Potassium iodide, Potide	KI
Knollide	Kalium iodide, Potassium iodide, Potide	KI
Lye	Caustic soda, Sodium hydroxide	NaOH
Metaxylene	m-xylol, Xylene	C_8H_{10}
Methane carboxylic acid	Acetic acid, Ethanoic acid, Ethylic acid, Vinegar	$C_2H_4O_2$
Methanol	Methyl alcohol, Wood alcohol	CH_3OH
Methyl alcohol	Methanol, Wood alcohol	CH_3OH
Methyl benzene	Phenyl methane, Toluene	C_7H_8
Methyl iodide	Iodo-methane	CH_3I
Methyl salicylate	Salicylic acid	$C_8H_8O_3$
Methyl trichloride	Chloroform, Trichloromethane	$CHCl_3$
Muriatic acid	Hydrochloric acid	HCl
m-xylol	Metaxylene, Xylene	C_8H_{10}
Nitrate of potash	Potassium nitrate, Saltpetre	KNO_3
Nitric acid	Aqua forti, Spirit of Nitre	HNO_3
Nitrosil	Ammonia, Hydrogen nitride, Sprit of Hartshorn, Vaporole	NH_3
Oil of vitriol	Sulfuric acid, Sulphuric acid	H_2SO_4
Permanganate of potash	Condy's crystals, Potassium manganate(VII), Potassium permanganate	$KMnO_4$
Phenol	Carbolic acid	C_6H_5OH
Phenyl methane	Methyl benzene, Toluene	C_7H_8
Plaster of Paris	Calcium sulfate, Calcium sulphate, Plaster of Paris	$CaSO_4$

Potassium iodide	Kalium iodide, Knollide, Potide	KI
Name	**Synonyms**	**Formula**
Potassium manganate (VII)	Condy's crystals, Permanganate of potash, Potassium permanganate	$KMnO_4$
Potassium nitrate	Nitrate of potash, Saltpetre	KNO_3
Potassium permanganate	Condy's crystals, Permanganate of potash, Potassium manganate(VII)	$KMnO_4$
Potide	Kalium iodide, Knollide, Potassium iodide	KI
Propan-2-one	2-propanone, Acetone, Beta-ketopropene, Dimethyl ketone, Propanone	CH_3COCH_3
Propanone	2-propanone, Acetone, Beta-ketopropene, Dimethyl ketone, Propan-2-one	CH_3COCH_3
Realgar	Arsenic sulfide, Arsenic sulphide	As_4S_4
Salicylic acid	Methyl salicylate	$C_8H_8O_3$
Saltpetre	Nitrate of potash, Potassium nitrate	KNO_3
Sodium chlorate		$NaClO_3$
Sodium hydroxide	Caustic soda, Lye	NaOH
Sodium tungstate(?)		$NaWO_3$
Spirit of Hartshorn	Ammonia, Hydrogen nitride, Nitrosil, Vaporole	NH_3
Spirit of Nitre	Aqua forti, Nitric acid	HNO_3
Sulfuric acid	Oil of vitriol, Sulphuric acid	H_2SO_4
Sulphuric acid	Oil of vitriol, Sulfuric acid	H_2SO_4
Toluene	Methyl benzene, Phenyl methane	C_7H_8
Trichloroacetaldehyde monohydrate	Chloral hydrate	$C_2HCl_3O\ H_2O$
Trichloromethane	Chloroform, Methyl trichloride	$CHCl_3$
Vaporole	Ammonia, Hydrogen nitride, Nitrosil, Sprit of Hartshorn	NH_3
Vinegar	Acetic Acid, Ethanoic acid, Ethylic acid, Methane carboxylic acid	$C_2H_4O_2$
Water	Aqua, Dihydrogen monoxide, Hydrogen hydroxide, Hydroxic acid	H_2O
Wood alcohol	Methanol, Methyl alcohol	CH_3OH
Xylene	m-xylol, Metaxylene	C_8H_{10}
Zinc (II) bromide	Zinc bromide	$ZnBr_2$
Zinc bromide	Zinc (II) bromide	$ZnBr_2$

Formula	Names
As_4S_4	Arsenic sulfide, Arsenic sulphide, Realgar
$C_2H_4O_2$	Acetic acid, Ethanoic acid, Ethylic acid, Methane carboxylic acid, Vinegar
C_2H_6O	Ethanol, Ethyl alcohol, Hydroxyethane
$C_2HCl_3O\ H_2O$	Chloral hydrate, Trichloroacetaldehyde monohydrate
$C_3H_8O_3$	Glycerin(e), Glycerol
C_6H_5OH	Carbolic acid, Phenol
C_6H_6	Benzene, Benzol
C_7H_8	Methyl benzene, Phenyl methane, Toluene
C_8H_{10}	Metaxylene, m-xylol, Xylene
$C_8H_8O_3$	Methyl salicylate, Salicylic acid
$CaSO_4$	Calcium sulfate, Calcium sulphate, Gypsum, Plaster of Paris
$CH_3(CH_2)_3OH$	1-hydroxymethylpropane, 2-methyl-1-propanol, fermentation Butyl alcohol, isobutanol, iso-butyl alcohol, isopropylcarbinol
CH_3COCH_3	2-propanone, Acetone, Beta-ketopropene, Dimethyl ketone, Propan-2-one, Propanone
CH_3I	Iodo-methane, Methyl iodide
CH_3OH	Methanol, Methyl alcohol, Wood alcohol
$CHCl_3$	Chloroform, Methyl trichloride, Trichloromethane
H_2O	Aqua, Dihydrogen monoxide, Hydrogen hydroxide, Hydroxic acid, Water
H_2O_2	Dihydrogen dioxide, Hydrogen dioxide, Hydrogen peroxide
H_2SO_4	Oil of vitriol, Sulfuric acid, Sulphuric acid
HCHO	Formaldehyde, (Formalin = 37% Formaldehyde)
HCl	Hydrochloric acid, Muriatic acid
HNO_3	Aqua forti, Nitric acid,Spirit of Nitre
I	Iodine
KI	Kalium iodide, Knollide, Potassium iodide, Potide
$KMnO_4$	Condy's crystals, Permanganate of potash, Potassium manganate(VII), Potassium permanganate
KNO_3	Nitrate of potash, Potassium nitrate, Saltpetre
$NACIO_3$	Sodium chlorate
NaOH	Caustic soda, Lye, Sodium hydroxide
$NaWO_3$	Sodium tungstate(?)
NH_3	Ammonia, Hydrogen nitride, Nitrosil, Spirit of Hartshorn, Vaporole
$ZnBr_2$	Zinc (II) bromide, Zinc bromide

Letter to the Editor

Ich kann Dir sagen wie Möller, der bereits 1890 über 100 Mikrofotographien von Diatomeentypenplatten angefertigt hat, und nicht nur eine Diatomee sondern die ganze Platte mit großer Tiefenschärfe abgebildet hat, vorgegangen ist.

I can tell you that Moeller, by 1890 had already made over 100 micro photographs of Diatomeen-typenplatten, and these were not of a single diatom but the whole plate with a large depth of field, the sharpness of which is illustrated below.

Er benutzt monochromatisches Licht und eine einzige Linse von Leitz mit einer Brennweite von 30 mm. Über eine entsprechend lange Vergrößerungsstrecke kam er zu tiefenscharfen Bildern der ganzen Platte. Man kann zu ähnlich guten Ergebnissen kommen, wenn man nicht mit einem Mikroskop fotographiert sondern mit einem z. B. Minox - Vergrößerungsgerät ein Präparat anstelle des Films einlegt und auf Fotopapier ein Bild auf diesem Weg herstellt welches man dann digitalisiert.

His method used monochromatic light and only one lens, a Leitz with a focal length of 30mm. Over an accordingly long enlargement distance he achieved deep, sharp pictures of the whole plate. One can come to similarly good results, if one uses, instead of a microscope and camera, an enlarger, a preparation in place of the film and photographic paper on the base. The picture produced and developed may then be digitized.

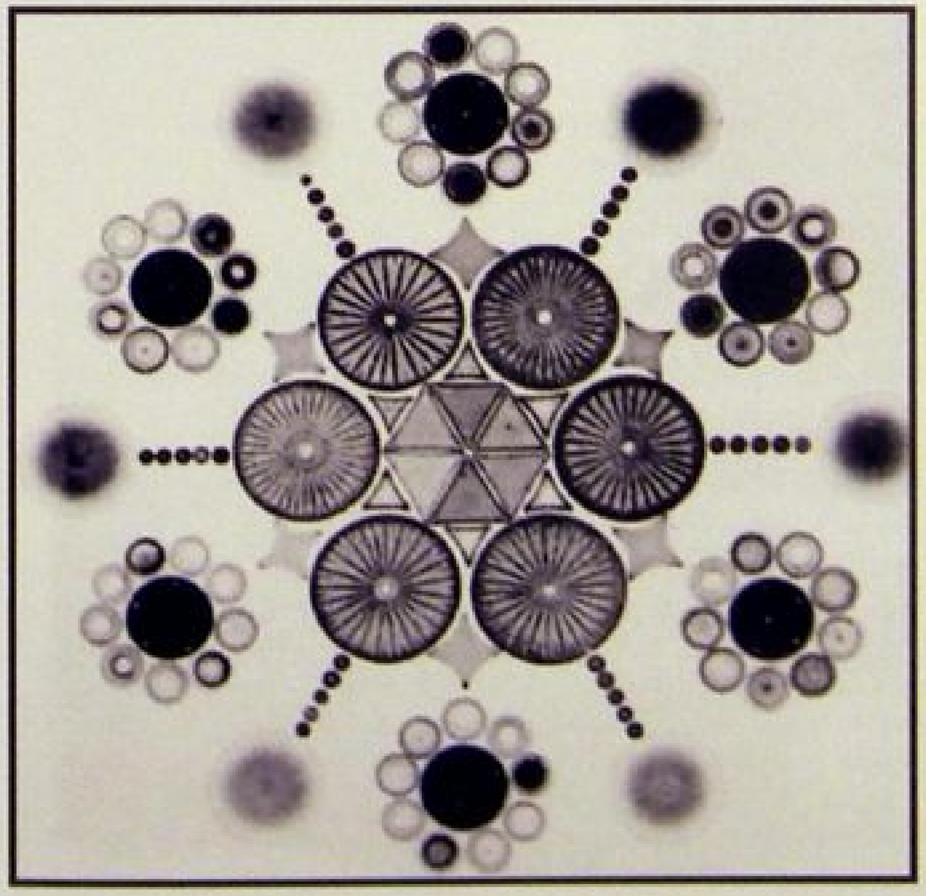
Das im Anhang angehängte Bild ist ein Scan von einem Möllerschen Glasplattenabzug von 1892

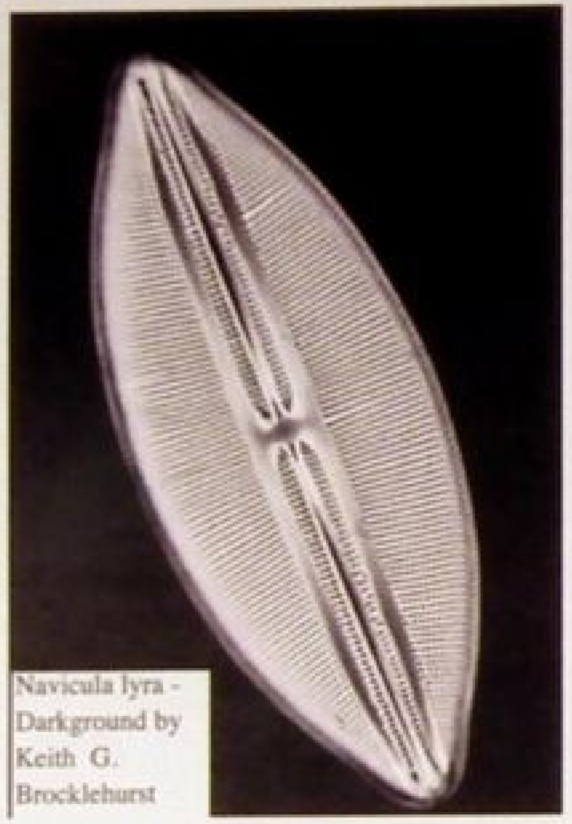
The picture attached is a Scan of a Moeller glass plate from 1892

Einen schönen Abend wünscht

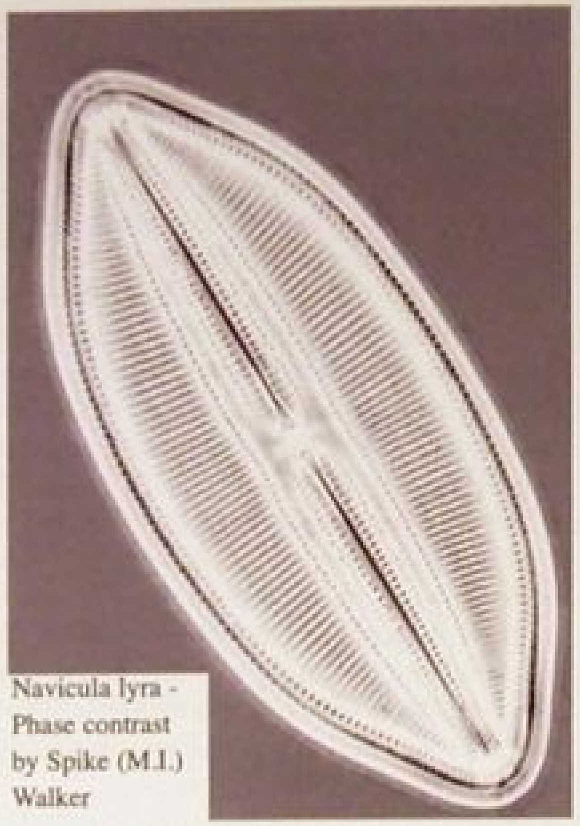
Wishing you a good evening,

Matthias Burba





Navicula lyra - Darkground by Keith G. Brocklehurst



Navicula lyra - Phase contrast by Spike (M.I.) Walker

Free Data CD - The CD contains two publications. The first relates to the work of Moeller and comprises a collection of historical material relating to this mounter. The second is a very recent dissertation by Miss Katherine Alice Coaker in which she analyses the results of a study on the effects of Remediation of Acid Mine Drainage on streams using their diatom flora as bio-indicators. The work takes into account some of the environmental parameters we have previously mentioned - pH, temperature etc. and introduces some statistical techniques that are a major feature of population and variation analysis today.

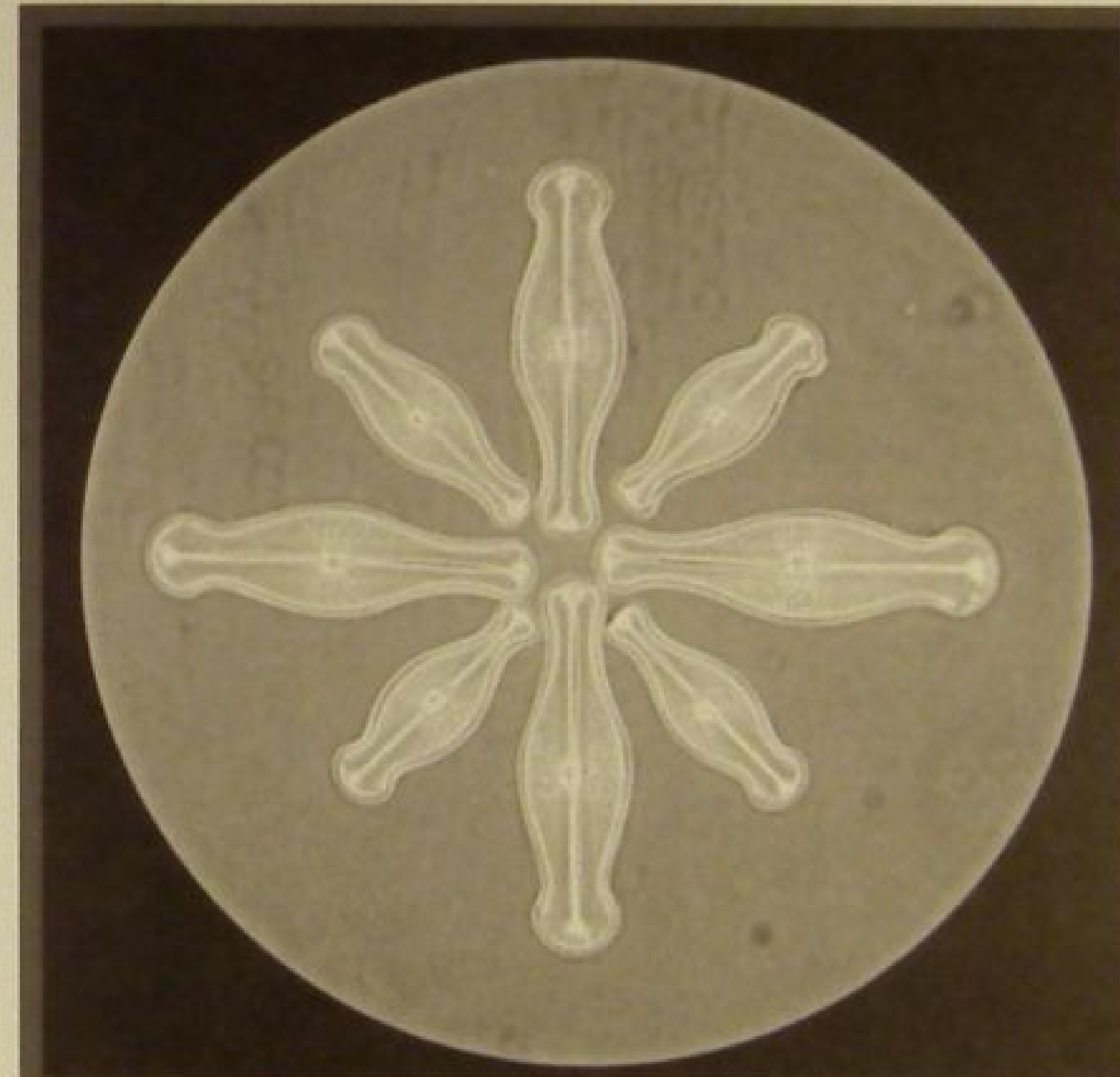
Abstract

The aim of this study was to assess the need for remediation of Acid Mine Drainage. This was done by evaluating both the effectiveness of passive remediation plants and the effect of acid mine drainage on the micro invertebrate communities of riverine systems. Diatoms were used as bioindicators to assess four streams in the Lancashire and Yorkshire coalfields: an unaffected stream, a steam actively receiving acid mine drainage and two remediated streams, using aerobic surface wetland systems. To date there have been no known studies of this kind conducted within the UK.

Analysis of the present day hydrochemical parameters and diatom diversity, richness, density and rarity demonstrated significant floral impoverishment as a result of AMD, with the remediated sites showing a distinct unique community composition reflecting neither the polluted nor the reference conditions. *Achnanthidium minutissimum* was the most widely occurring species, with *Pinnularia subcapitata* and *Eunotia exigua* characteristic of the polluted site and *Fragularia capucina* reflecting the remediated sites. Temperature, pH and dissolved oxygen proved to be the main drivers of the change, with mean iron concentration and conductivity showing lesser importance. Overall these findings advocate the implementation of long term remediation of AMD.

The next issue of

The Amateur Diatomist



Notes for contributors.

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"No one of us know all there is to know, and yet we do not know what we do not know." - Anon.