IBBS World

Newsletter of the International Biodeterioration & Biodegradation Society

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August 2020

IBBS18

International Biodeterioration and Biodegradation Symposium
Bozeman, MT

IBBS 18 postponed until 2021
in light of the unprecedented global pandemic

Updates by Brenda Little and Joseph M. Suflita inside the Newsletter

The new dates for IBBS18 are:
7-10 September 2021

IBBS 18 will still be held on the campus of Montana State University (MSU)
Bozeman, MT

IBBS Membership benefits

Reduced registration rates at IBBS and FEMS sponsored conferences, meetings, symposia.
IBBS national representatives in many countries can help members with the organization of small local meetings.
Eligible for annual IBBS Graduate and Postgraduate Bursaries (up to £1,000), IBBS Small Meetings Bursary, FEMS Research Grants, FEMS meetings grants. On page 20 details on membership and fees.

Welcome to the IBBS Newsletter!

This newsletter is usually sent out every 4 months. If you have any news, meetings, webinars you would like us to publicise on the IBBS Newsletter, or a crossword on an appropriate topic, please contact us via our IBBS Hon. Secretary: secretary@ibbsonline.org

We need a text written in .doc, .rtf or .txt formats. The pictures should be of good quality (but not too big) in any of the usual formats (.jpg, .tif, .bmp), preferably not embedded into texts or other documents. Each image should be accompanied by a short caption. In case you add a link to websites, please check that the link and the website work.
Thank you!

Flavia Pinzari

Special Summer Edition!

In this number:
Microbiology Poems
by IBBS members
IBBS18 September 7-10 2021  
Montana State University (MSU),  
Bozeman, MT

Dr. Joseph Suflita, Chair of the Organizing Committee for IBBS18, and I are eager to share good news related to IBBS18. The image accompanying this article was collected during an April 2019 visit to MSU and Yellowstone National Park.

IBBS18 was rescheduled from September 2020 to September 2021 because of the COVID19 pandemic. Rather than cancel or postpone, numerous 2020 conferences were moved on-line. However, on-line conferences cannot replicate the social networking opportunities of the in-person conference experience. One emphasis for IBBS18 has always been career development opportunities for early career scholars (ECS). The technical program has been specifically designed to introduce ECS to established researchers in biodeterioration and biodegradation and structured to foster collegial interactions among attendees.

Before COVID, Dr. Suflita had secured both US Government and private corporation funding to help support IBBS18. Several of those sponsors have indicated that their commitment will be extended to the 2021 meeting. Corporate sponsors that withdrew funding have indicated a willingness to reconsider once their businesses have returned to normal. Other good news is that MSU facilities and all venues related to social activities, i.e., Hart Ranch and Museum of the Rockies, will be a part of the 2021 meeting. Attendees to IBBS18 can also count on the optional guided tour of Yellowstone National Park.

During the isolation mandated by regulations and common sense, several IBBS members reported that they are been analyzing data, writing papers and planning experiments for a return to offices and laboratories. The number and quality of submissions to the recent IBBS poetry contest are indications of the sustained creativity of IBBS members. One can predict a renaissance of scientific productivity after COVID that will be reflected in papers at IBBS18.

Abstract submission for IBBS18 will be re-opened in April 2021. Don’t wait until the last minute. Submit your abstract early and contribute to the good news for IBBS18. Details will be provided in the next newsletter.

Brenda Little  
(IBBS President)
Microbiology Poems

by IBBS members

introduced by a commentary by Sam Illingworth
Senior Lecturer in Science Communication at the University of Western Australia

We have
a map of the universe
for microbes,
we have
a map of a microbe
for the universe.

*Miroslav Holub – ‘Wings’*

Poetry is perhaps not the most obvious medium through which to describe the biodegradation and biodeterioration of commercially important materials. However, as evidenced by this short extract from a poem by the Czech immunologist and poet Miroslav Holub, poetry provides an investigatory lens through which we can analyse, re-consider, and crucially poke fun at science.

Ever since the notion of a 'scientist' was first formalised by William Whewell in the early nineteenth century (and indeed long before then), scientists have written poetry alongside their scientific research. Whether this is the experiments in poetic aesthetics conducted by Humphry Davy in his investigations into the medical powers of nitrous oxide, or the verses that Ronald Ross wrote to first capture his observations that mosquitos were a vector for malaria. Poetry affords us an opportunity to think about our research in abstract terms; it also provides fresh eyes to help us devise new solutions to old problems.

Science and poetry are not mutually exclusive entities, rather they offer a complementary way of trying to understand the world and our impact upon it. In reading the poems that feature in this newsletter, consider the ways in which they interrogate and cause you to reflect on your own research and fields of expertise. And then challenge yourself to write your own, you might be surprised to find where they lead…

Dr Sam Illingworth is a Senior Lecturer in Science Communication at the University of Western Australia, and author ‘A sonnet to science: scientists and their poetry’ (Manchester University Press, 2019). He is an editor of the new poetry journal ‘Consilience’ (www.consilience-journal.com), the online poetry journal exploring the spaces where the sciences and the arts meet. Submissions are welcome.
"In reading these poems I was reminded of the creativity with which scientists conduct their research on a daily, if not an hourly basis. These poems are playful, insightful, and in many cases inspirational, and I would recommend printing out a couple of them to put in your lab / on your office wall to remind you of why you are doing your research in the first instance. I don’t want to single out any one poem, as I took something from all of them (such is the power of poetry), but I think that the lines “And then it will all be gone // And someday life will be normal again” from the poem “It’s only a virus” are an extremely prescient mantra for all of us to be considering at the moment…”

_Sam Illingworth_

**An IBBS Chronical**
- anonymous

An IBBS saga in "poem"
To Montana we thought we were goin’
But fate dealt a cruel blow
When Corona stole the show
And now we rethink what we’re knowin’

Our plans were once quite solid
Gathering to share our deep knowledge
But the scheme was rudely disrupted
When the global pandemic erupted
And set off M-bio interruptus

The health experts were all insistent
That we must be socially distant
Perhaps masks will be part of our scene
As we wait for meeting eighteen
And the promise of a robust vaccine

The papers so dutifully submitted
Sadly, could not be transmitted
But do not retract once committed
Or else you might be omitted
Since the meeting is slightly re-scripted

Postponement of all our contracts
we’ll let 2020 elapse
Then look forward to sessions jam-packed
Where we’ll be able to make eye contact

So, let’s skip this precarious year
And use it to save up with cheer
For a meeting that is second to none
in September of 2021

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To all of the loyal IBBSers
Let’s emerge from our shelters as victors
The meeting will be science elixir
As we toast each other at the mixer

**It’s only a virus**
_Jimmy Walker_

It’s a virus, it’s a virus
Run, run it’s coming
Put on your facemask
Put on your facemask
But it’s a virus
It’s smaller than the pores in your facemask
It won’t stop you getting the virus
Put on your facemask
Put on your facemask
The BBC record is broken
It just keeps going round and round
The virus is coming
The virus is coming
We are all going to die
But it won’t feel like a cold
You might even think that you have flu
Put on your facemask
Put on your facemask
It really will make no difference
The majority will just get better
And there will be less deaths than with flu
The virus is coming
The virus is coming
And then it will all be gone
And someday life will be normal again
Coronavirus cracker

Jimmy Walker

The planes are evident by their absence
Long ago noticeable by their contrails
That for now are consigned to history
Vast volumes of cars no longer troll the roads
Death and destruction devastated at the stroke of time.
The noise of the odd vehicle is now interspersed
By natural sounds once drummed out by the engine and
tyre noise.
Now the birds sing and their songs can be heard.
Calling, mating, a tune in the background.
Now listened to by so many.
Who before were unable to hear the lullabies.
Even the pigeons roosting in the trees
Appear to have a loud cooing, a cooing that
Not so long ago could not be heard
Due to the constant noise instead of which there is now a
stillness,
A peacefulness that is a result of lock down due to
coronavirus.
But stuck at home many are listless.
Their feet are itchy, they are anxious and champing at the bit.
Wanting to be let off the leash.
To run free and give someone a cuddle
But for now they must remain.
Relaxing the lock down will risk lives,
Will introduce others to the virus and spread it wide.
Leading to further deaths.
So for now my friend.
Remain still and calm your itchy feet.
Be patient, behave, breath in and out.
Maintain your social distancing and wash your hands.

It’s in the Air

Jimmy Walker

It’s in the droplets, it’s in the air,
A droplet is a droplet is a droplet.
How long will that droplet hang around?
A second, a minute, an hour?
If that droplet is an aerosol then it may
Hang around for much longer,
Maybe even for hours and hours.
Wafting around, moving in the current.
Waiting to come into contact with someone.
Perhaps just as they breathe in,
Taking that small aerosol particle way down
Deep into their lungs.
That aerosol does not know if it is smaller or larger
than 5µm.
A scientific differentiation that no one has told the virus
about.
And these larger aerosols, or are they droplets?
They will drop out, all at different rates.
Dropping or settling on surfaces in a gradation of time.
Surviving and still being infectious for days.
Landing on you and the surfaces all around you,
Including your face, your hands, your clothes, your hair
and your beard.
You use those hands for all sorts of things.
You touch, hold and contaminate things with those
hands.
You have thoughts and you bring your fingers to your lips.
A natural gesture, in thought as you touch your lips,
Pick your nose, rub your eye and run your hand
through your beard.
Inadvertently the virus in those droplets on your fingers
or hands
Are given a way round and passed your defences
And your impenetrable skin.
In through your mouth, your nose, your eyes into your body.
Invading your cells and attacking your immune system.
Waiting to take away your sense of taste and smell.
You should have washed your hands.
Simple soap and water, how simple can it be.
You should have followed government advice.
It might not yet be too late, your body may be strong.
The virus knows no borders, nor whose country it
invades.
You may be rich, you may be powerful.
The virus does not discriminate.
Does not know rich from poor, medic from patient,
Royalty from homeless.
No one tells the virus whom it can or cannot infect.
The cunning culling coronavirus, curtailing our freedom
And taking away our loved one.
Taking away our last chance to say goodbye.
Life will never be the same
Jimmy Walker

Life will never be the same
70, you can't be 70,
Well 70 I am
Now on my own I am
Socially isolated, a social outcast
Sent to Coventry
But I don't know if I need to go today
Or at the weekend
What do they mean from the weekend
The guidance is not clear
The guidance is vague
Is that Friday, Saturday or Sunday?
Is it noon, is it midnight?
I will have to walk on my own
I will have to cycle on my own
Stay back, stay away, get back 2m
Yes 2m get right back, don't come close
Life will never be the same.

The Virus
Jimmy Walker

A quiet street
There is no one there
No one shopping
No one on the bus
Businesses are empty
The phones are busy
Whats app is in meltdown
Twitter is screaming red hot
Skype is on its limits
The kids are at home
Cos the schools are all closed
Ocada is unbookable
Deliveroo is not delivering
The pub landlord is pulling a pint
But that is only for them
Everyone is at home
Too scared to go out.

Panic, Panic, Panic
Jimmy Walker

We have no bog roll
The sanitiser shelves are bare
Run, run, the virus is coming
Empty shelves, everyone stockpiling
My shelves are full, so stuff you lot
I am the bog roll king
Yet this is a virus that gives you a cold
Not a virus that gives you diarrhoea
Panic, Panic, Panic
I must get to the shops before the shelves are empty
I just might need to self isolate for a whole 14 days
Now where did I put all that bog roll
Empty shelves, panic buying
Bullies exerting their strengths in different ways
Run, run, the virus is coming
Panic, Panic, Panic
Panic, Panic, Panic
The virus is coming
I need all my soaps
I need all my bog rolls
I am well kitted out
Me, I am okay,
You, who are you
I don't care about you.

Those pesky bugs
Jimmy Walker

We are so big and so powerful but so often we are not in control
The little things in life come back to haunt us.
When we let our guard down those pesky little bacteria surprise us with their ferocity.
Small preterm babies, ill patients, not feeling well, being immunocompromised are the ones at risk.
Just when we thought the water was safe to use the bacterial biofilm grows in silence
Releasing their bombs in the form of sessile free floating microorganisms.
Ready to come into contact with the most vulnerable in the ward.
Flowing out the taps at maximum velocity contaminating the sink and surrounding area,
Into the drain they set up an unlimited recontamination stream.
Trained cleaners with cloths, fastidiously trying to remove the bacterial contamination and biofilm,
Are not equipped to deal with these little terrors.
The biofilm hanging like stalactites from the outlet fitting is persistent beyond our wildest imagination.
Our patients are at the mercy of those pesky little bugs for in more ways than one we are defenceless and outnumbered.
Were you depending on someone?
Jimmy Walker

The peak has passed
But the mountain is still to be conquered.
Hospitals full of covid patients.
Seriously ill and facing death like 759 others yesterday.
Without the touch and closeness of loved ones,
Kept at a distance so far away that social distancing
Does not apply
For those that live there is the loving care by healthcare
Professionals stressed, pressurised with their backs against the wall
Dealing with the never, never situation
Which this time is not to do with harm to patients
But playing Russian Roulette with their PPE
Is this situation high enough risk that
I want to wear my FFP3 mask if there is
An aerosol generating procedure.
Or will we contravene all your training
And instead of discarding your single use PPE
Retaining it and reprocessing it for another day.
Someone has let the side down
Someone should have looked ahead
Someone should have been planning
Someone should have been doing their job
With NHS staff putting their life on the line
They are depending on someone.

This time
Antonio Portugal

In this time of pandemic and lockdown
Our souls are feeling very down
But thinking of Biodeterioration is giving us a strong motivation.

Guess who? (with apologies to John Masefield)
Chris Gaylard

Dirty, black and smelly,
With an iron-caked membrane,
Butting through the steel stacks in the benthic slime,
With an enzyme for breathing, sulfurizing, rusting,
Eating through the metal of the oil pipeline.

This is me
Chris Gaylard

I float, I fly
As free as air.
I can gain entry anywhere.
You don't see me.

I cross borders;
I break barriers.
Me and mine, you carry us.
No stopping me.

Pick me up,
Or pass me instead.
No matter, I'm already dead.
I'm waiting for you.

You'll make me live.
I'll keep you to myself.
"But what" you ask, "what if... when I bring friends, you tire us?"
Smiling, I say "No problem, host, I'm virus".

Wonderment
Chris Gaylard

The sinuous curves, winding, twisting,
I look, I marvel, my pupils lock.

And now by twirling a string appears,
the green pearl chain of a pure Nostoc.

And winding more until a ball forms 'neath my eyes.
What have I seen?

An alga? No!
The helix's bare.
The cell's aware it's just, just simply, a blue-green.
Biodeteriogen life
Maria Iasmina Moza

We struggle a lot to be
Whatever the substrate affords
No one believe us how much effort
And struggling that could be

Even if you are a fungi
A lichen, moss or bacteria
There are different survival criteria
And no one in our place could be

Sometimes is nice
When we are many
We can even watch a film
Actually forming a biofilm

I personally prefer cyanobacteria
Me being a small round bacteria
Since they are the oldest
And populate all kinds of substrate

They even allow me to stay in their EPS
And I love that so much
They kept high the humidity
So my cell can multiply

Sometimes in winter
I also love moulds
They grow so enormous
And can form snow globes

My life could be sometimes hard
When people don’t like hard work
And try to kill me with biocide
Sometimes make me form protective suicide

Bacteria spores are a good way
To keeps us safe but without energy
Till all my friends gathered again
And help me germinate in high humidity

My life is short you can affirm
But happy in a biofilm
We can even have different colours
Or moving promoters

We pose also genetics mechanism
Bacteria we will says huh?
I know that we are so small
But killers anyways!

So do not give us biocide
Is not our fault you know?
That this nonconformist covid
Decide to walk outside

I hope that you are convinced
That even if we biodeteriorate
We are somehow forced
Being our simple way to survive!

And please forgive my cousins
Yeah, those nasty pathogens
They like to form films
In human blood or lungs

And remember always my aunties
The ones that live inside you
More exactly in our intestines
And help you not to feel blue

I also wish I could be able to write
Me, an unschooled bacteria
In order to expose all my biofilm stories
To make you wish to become yourself a bacteria!

A rock at Skara Brae on Orkney - "ancient lichen tell their story"
(see: http://www.orkneyjar.com/history/skarabrae/)
credits: Johanna Verran

Vote for your favourite!

Does one of these poems (on pages 4 to 10) speak to you more than others? Send the title of your favourite poem - or favourites - to the IBBS Secretary before 15th September:
secretary@ibbsonline.org

Have the poems inspired you? If we receive more we will publish them in the next newsletter...
Intrusive
Flavia Pinzari

I am spreading
the painting is fading,
I am breathing
searching for water,
I am living
marching for fiber,
I am hoping
my enzymes go deeper
striving to reach the sugar
I miss,
I am leaching your feelings
persuading your art will not last

Haikus

Hans-Curt Flemming

microbially influenced
corrosion:
so many researchers
barking up so wrong
trees

Hans-Curt Flemming

biodeterioration
a word
like an accident

Piscina 1
Matthew Beesley

Double-piscina nitched and canopied,
Bell finial tips spring-filigreed,
Votive offerings seep the surge,
Of diurnal tides recessed to merge.
Chlorella verdant, spirulina blue,
Blood green nucleated algal hue,
Waters brine or fresh, the stones perspire
Gilded sulphide beads, a kindled pyre.
Sea polychrome dried, now swathed,
With chalk the coccoliths displayed,
Each grain a polarising cross to bear,
Assemblages as body and soul where,
Water, oil and ash, life restored,
Vortexed through the drain-hole poured.
Abide, proceed, return: the piscina healed,
Symbiose of light and form, her refuge sealed.

Fragments of coccoliths in gypsum
(SEM image by F.Pinzari)

Explanation: The poem refers to an early medieval stone piscina, manufactured from clunch stone, notorious for iron pyrites decay. It intimates at the anaerobic bacteria reducing seawater sulphates to sulphide, then reacting with iron to form pyrite, in marine sediments during a regressive sea environment. So, sulphate-reducing bacteria, decaying organic matter, anoxic conditions, permineralization replacement, re-introduction of calcite in the form initially of nano-lime solutions as treatment to consolidate, and create coccoliths as biomineralization processes, particularly the crosses on individual grains of coccoliths under PLM.
The poetic imagery shifts from decay to revival, implying the transformation of living organisms, metamorphosis to ‘fools gold’ pyrites, while also restoring the function of the piscina, as a vehicle to discard Holy Communion water, oil and ashes through the piscina's drain hole, for continued uses, as a symbiosis.
Dry Rot is only a Displaced Forest Fungus
Sarah Watkinson

Imagine the time when it was an unknown plague:
you’d go down into your damp cellar for wine
and the ladder would crumble, your foot in space,
wine racks draped in a duvet of fungal candyfloss,

and when you went back into your front room
you’d notice the floor would have buckled oddly
under the carpet; which itself, cotton-backed
would fall apart in dark shreds as you lifted it.

Later, you would hear of other afflicted buildings
and how the source of it all was mysterious
the outbreaks seemingly quite random across town;
was it spread, perhaps, by workmen’s tools?

O why is wet cellulose a meal for fungi
and not for us? How we’d enjoy snacking
on moist kitchen roll, and the Sunday lunch
of an untreated whole softwood plank!

We fear rot, but it never meant us harm –
old dweller in cool northern forests of conifers
on rainy crags. Involuntary stowaway in timbers
destined for distant cities, it survived strange times

in dockyard stacks – then found a kind of home
wherever rain got in and stayed - on dewy walls,
behind the panels of closed-up conventicles -
were feasts of pine, moist as in Fennoscandia*.

(*For explanation, see Watkinson & Eastwood,
2012, Advances in Applied Microbiology)

Doggerels and Limericks

Chewing
Chris Gaylarde

There was a young bug from Brazil,
Who said, "I'll not make you all ill."
I'll stay in this table
As long as I'm able
And pile up the frass in a hill".

Armies
Chris Gaylarde

The military might of the termite
Is a wonderful sight to behold.
While guarding the workers the whole night
They're marching, or so I am told,
In uniform files to-and-froing from piles
Or mounds, where they cultivate mould.

Corrosion
Fred Passman

We once thought that sulfate reducers
Were the only corrosion inducers.
We chose to ignore fermenters galore,
And their role as acid producers.

Fuel
Fred Passman

If you find many bugs in your fuel,
And choose to dismiss them, you're a fool.
Be mindful that dormant can quickly become torments
When they move from stasis to solid bases.

My favorites
Irene Davidova

Some pretty bacterial girls
Are hungry for smelly oil swirls
They would swim a great distance
And chew them in instance
Those magnificent bacterial dolls!

Leather
Pete Askew

A group of young boffins together
 Tried to stop the rotting of leather.
After decades of working
(And a fair bit of drinking),
They gave up and just blamed the weather.

Plastic
Robbie Coffin

We work to protect plastic
As a material it is quite fantastic,
But it's filling our oceans,
From all sorts of potions;
We must do something drastic!
Tineid moths as biodeteriorating agents, with a focus on the remarkable biology of *Tineola bisselliella*

David C. Lees  
*Microlepidoptera Curator, Natural History Museum, South Kensington, London SW7 5BD, UK*

Clothes moths have been regarded since time immemorial as a scourge for humans on this planet. In his History of Animals, Book 5, Chapter 26, Aristotle wrote [as translated] "There are other small animals... some of which occur in wool and woollen goods, as the ses [clothes moth] and these animals come in the greatest numbers when the wool is dusty". In an unconvincing remedy according to Pliny (70 AD) "A suit of clothes placed upon a coffin will forever proof against the teeth of moths". In Coriolanus, William Shakespeare wrote "You're like another Penelope, except they say that all the yarn she spun in Ulysses' absence only filled Ithaca with moths". The writings of Aristotle, Aristophanes, Pliny, Shakespeare, if they do not refer to other wool-infesting, synanthropic, tineids (Robinson, 1979), are likely to refer to *Tinea pellionella* (L. 1758), the Case-bearing Clothes Moth. This species of Tineidae has been around man for a long time. Recently, I took part in a study to determine moth cocoons found to have incorporated fragments of textile from an Egyptian mummy that were dated 210-430 BC (Oras et al. 2020) and one is almost certainly identifiable as *T. pellionella* (Fig. 1), but in this case the actual date of incorporation could not be deduced. However, incorporation of human hairs into the cocoon of *T. pellionella* has actually provided forensic evidence of human DNA when pupating in corners of rooms away from the deceased (Bucheli et al. 2010). Nevertheless, the mummy cocoon represents probably now the oldest documented specimen of this moth.

The early reports of moths attacking garments cannot have been referring to the Common or Webbing Clothes moth, *Tineola bisselliella* (Hummel, 1823) (the larvae of this species live in silken tubes rather than bearing cases). This is because the species is understood to have spread into Europe remarkably late, in the early Victorian era if not late 18th Century (Plarre & Krüger-Carstensen, 2011), probably from Africa (considering that its putatively closest relative, indeed only congeneric, *Tineola anaphoeca* Gozmány, 1967, is a ridiculous species from West Africa that was found in processionary moth nests). Today it is *T. bisselliella* which seems to cause the most damage to households, and the species does especially well in centrally heated houses. It is currently of considerable concern in museums and galleries too, especially for the biodeterioration of tapestries.

Although there are many negative connotations of such tineid moths, we should not neglect the remarkable aspects of their biology. With rudimentary mouthparts, the adults do not feed, and despite this the adults of *T. bisselliella*, for example, can live 10-44 days (unpaired females averaging 21 days and males 36 days according to Griswold, 1944). They mostly conserve energy by sitting still and fly mainly at the crepuscule, especially in warm weather. Alongside keratolytic fungi, bacteria and dermestid beetles, larvae of these moths though, are among the foremost organisms in the wild to break down hair, wool and even horn. Many Tineidae are fungivorous but the genera *Tineola*, *Tinea*, *Monopis*, *Trichophaga*, *Ceratophaga* belong to a group of Tineinae which are facultatively detritophagous and keratophagous. Just a few species are obligately keratophagous though, such as *Tinea pellionella* and *Ceratophaga vastella*. It is possible that the digestion of keratin evolved originally through some route involving a synergistic use of keratinases produced by fungi (Piarre & Krüger-Carstensen, 2011).

Such members of the family Tineidae are incredible in this ability not only to exploit keratinases to digest hair and feathers as well as shed skin (although some Oecophoridae moths, notably *Hofmannophila pseudospretella*, use them too). They have modified guts too, and these caterpillars are capable of breaking the strong disulphide linkages between cysteine residues (cysteine is a major component of wool), using a wide array proteolytic enzymes under the almost anaerobic, high pH and strongly reducing conditions of their midguts (Robinson, 2004). Unlike in biodeteriorating beetles, the key enzyme used by *T. bisselliella* to cleave these sulphur bonds and allow the other enzymes to get to work is L-cysteine lyase/desulphydrase (Robinson et al., 1993).
Members of the family Tineidae play an important and quite diverse ecological role fungivores and detritivores. In the wild, birds' nests are a favourite natural habitation of many tineids and the Natural History Museum's late Gaden Robinson (at his time the greatest tineid authority) used to place out artificial birds nests in the tropics as a collecting technique for unusual species. In extreme cases, larvae of some species even cut their teeth on gopher tortoise shells in Florida (Ceratophaga vicinella : Deyrup et al., 2005) or horn on the African savannah (C. vastella). The latter actually bores with its silken tubes into the horn but the tortoise shells are too hard or thin for boring (Deyrup et al., 2005). Tineola bisselliella larvae feed on cotton, linen, silk and wool, fur and feathers (Querner, 2016), but can also bite and ingest synthetic materials. In Europe, T. bisselliella are essentially synanthropic and relatively rarely found in the wild compared to other tineids, or even absent in the countryside (Plarr & Krüger-Carstensen, 2011). T. bisselliella, being oligophagous can be fed entirely on cholesterol, phytosterol and other lipids, which is a good reason for washing all traces of sweat from clothes before putting them away.

The biology and life cycle of T. bisselliella was first studied in detail by Griswold (1944). Under good resource conditions (around 24–28°C), and high humidity (around 70%), the life cycle takes about 45-70 days (Plarr & Krüger-Carstensen, 2011), with usually, under standard conditions, two generations a year. Under unfavourable environmental conditions (below 10°C and as dry as 20% humidity) a larva can live for several years, the silken tubes helping to prevent dessication. Larvae of T. bisselliella are furthermore able to respond to starvation by undergoing additional moults in captivity accompanied even by a decrease in size: remarkably, also under very poor diets as many as 40-45 moults over 900 days have been claimed, also resulting in stunted individuals (Titschack, 1926; Bucheli et al., 2010). This resistance of some Tineidae to dessication has also impressed me directly. One time, I collected a barn owl pellet in Madagascar and placed it in a small plastic box in my attic. I was surprised to find the box two years later, completely dry, with moths of a species of Monopis similar in appearance to M. monachella (as well as the much declined Tapestry Moth Trichophaga tapetzella) that were happily running around in it.

Remarkably, and unlike certain tineids, T. bisselliella is not, or is very rarely, attracted to light. It may be relevant that some tineids, including cave dwelling species, can complete their life cycle in darkness, and Gaden Robinson described a species with small eyes found in complete darkness (Lees & Zilli, 2019: 150). The control or trapping of species like T. bisselliella (Cox & Pinninger, 2007), aside from complete fumigation, is thus rather unsatisfactory, dependent on chemical repellents such as lavender, cedar, or more toxic chemicals such as naphthalene. However, male-killing pheromone sticky traps are now widely used for monitoring as well. As well as, of course, scrupulous cleanliness in every cranny, the deep freezing and cleaning of affected and treasured fabrics is essential since although they can feed on pure wool, the larvae are known to preferentially feed on dirty natural fibres (as Aristotle had astutely observed). Therefore they consume along with these fibres (being detritivores), dust particles rich in organic compounds, particularly lipids that are apparently an important part of their diet (Querner, 2016).

As in an ongoing debate (enzymatic or mechanical biodegradation? : Weber et al. 2017) regarding the recent reports of digestion of polyethylene in plastics into ethylene glycol by the pyralid moths Galleria mellonella (which can feed naturally on bees’ wax) and Plodia interpunctella (see Lees & Zilli, 2019 for more details), there is not enough known about the evolution of keratin-degrading Tineidae and how they have incorporated adaptations such as the evolution of enzymes to break down keratin, e.g. from their presumed fungivorous beginnings, and moreover the evolution of adaptations of a few species to feed directly on animal shells and horn. It is some time since it was concluded (Crewther & McQuade, 1955) that the negligible bacteriome in its high pH gut played no part in the digestion of wool by T. bisselliella. Yet modern molecular techniques may well be able to shed more light on the evolution of adaptations for biodeterioration in such fascinating moths, as well as the geographical and ecological origins of their synanthropy, which are still weakly investigated.
**References**


Griswold G.H., 1944. Studies on the biology of the webbing clothes moth (Tineola bisselliella Humel.). Cornell University Agricultural Experiment Station Memoir, 262: 1-59.


**IBBS Journal**

**From Editor-in-Chief**

The society journal is doing well and the new impact factor released at the end of June is 4.074 showing a small increment of 6.5% from the previous year.

There are two announcements for the journal. First, Elsevier has planned a migration of the journal's manuscript processing and handling system from the current Evise to Editorial Manager (EM), the latter is much widely used by different publishers. The change will take place on August 26/27 and the EM will be used for this journal. Second, my affiliation and email address have been changed and the new ones are Guangdong Technion – Israel Institute of Technology and jidong.gu@gtiit.edu.cn, respectively. The new information has been updated on the journal’s website for efficient communications.

Ji-Dong Gu
Editor-in-Chief

**NEW IBBS WEBSITE**

**IBBS has a new amazing website**

From there you can freely download PDF versions of volumes 1 – 22 of our journal International Biodeterioration & Biodegradation from its founding in 1965 (as the International Biodeterioration Bulletin) until publication was placed with Elsevier in 1987.

Visit IBBS new website: www.ibbsonline.org
Microbial culture collections at work: isolation, identification, characterization and valorisation of fungi and bacteria in bioremediation

by Giovanna Cristina Varese

In Europe, there are around 2.8 million sites where remarkable polluting activities take place. As a non-renewable resource, soil needs to be protected and managed in a sustainable way. Soil pollution represents a direct consequence of industrial activities, improper disposal of waste, with a detrimental effect on the ecosystem services provided by soil. Moreover, the problem can be transferred to other less known ecosystems, then enlarging the impact on the society. Reports from countries across Europe indicate that aliphatic and aromatic hydrocarbons are among the most frequent soil contaminants, including polycyclic aromatic hydrocarbons, phenols and chlorinated hydrocarbons. A focused protection and recovery policy is needed. Several technologies for soil remediation have been proposed highlighting how chemico-physical methods are often costly and energy consuming. The actual challenge is to find innovative technologies with a low environmental, economic and energetic impact. Nature-based solutions (bioremediation) are promising options to mitigate the soil degradation and have received worldwide a particular attention: they are usually simple and cost-effective methods, which have been found capable of reducing the contamination level. However there are still few successful in-field studies. The role of fungi and bacteria in bioremediation has been increasingly recognized. The combination of microorganisms and plants may enhance the total organic pollutants removal thanks to a synergic action of different metabolisms. The expertise of microbial culture collections plays a strategic role for the access, characterization and use of genetic resources for different users.

LIFE BIOREST (www.lifebiorest.org) project was focused to develop a sustainable bioremediation model for soil decontamination, based on the use of bacteria, fungi and plants. The bioremediation approach targeted the polluted soil of the National Interest Site (SIN) of Fidenza, Italy. An integrated approach used the autochthonous and ecologically adapted fungi and bacteria, the use of local agro-food byproducts as carriers of microorganisms and a final revegetation step. Various isolation techniques helped to isolate a wide library of bacteria and fungi (more than 500 isolated strains) that were then further tested to evaluate their actual capability to degrade pollutants. Isolated fungi mostly belong to Ascomycetes as Cladosporium, Aspergillus, Penicillium, Fusarium, Scedosporium, Trichoderma and Epicoccum. The bacterial isolates were mainly ascribable to the Gram- genera Pseudomonas, Sphingobacterium, Pseudoxanthomonas, Rhizobium and Acinetobacter. Several fungal and bacterial strains were very versatile, exploiting pyrene, phenanthrene, naphthalene, benzene and alkanes (paraffin oil) of sole source of carbon confirming their great adaptation skills. Most of them showed the production of extracellular oxidative enzymes (mainly fungi producing laccase) and biosurfactants (both fungi and bacteria). One of the major challenges in bioremediation is the bioavailability of pollutants. Biosurfactants are a huge group of chemically diverse molecules that have surface-active properties and emulsification action, plays an important role in numerous applications as in bioremediation.

Fungi isolated and identified from the polluted soil

Mycotheca Universitatis Taurinensis (MUT- www.mut.unito.it) belonging to the JRU MIRRI-IT (www.mirri-it.it)

Giovanna Cristina Varese

GC Varese is a full professor at the University of Torino (Italy) and she is the Head of the Mycotheca Universitatis Taurinensis (MUT). She is a mycologist with a PhD in "Fungal Biology and Biotechnology". Her research includes the manegement and valorization of a fungal collection of about 7000 fungal strains (including many marine isolates). She is the coordinator of the Italian network of microbial culture collections MIRRI-IT (www.mirri-it.it) and represents Italy in the EU research Infrastructure MIRRI (Microbial Resource Research Infrastructure).
Biosurfactants have many advantages respect to the synthetic counterparts: lower toxicity, higher biodegradability, possible biological activities, and possibility of being produced directly in situ by microorganisms. Up to now the production of biosurfactants and emulsifiers has been mainly investigated in bacteria; however in this project the production of biosurfactants has been highlighted in more than 70% of the fungal strains isolated by the contaminated site.

In order to select the best microbial consortium, 35 combinations of fungi and/or bacteria were tested in micro- and then in mesocosms to understand synergies and/or possible drawbacks. More in detail, 35 lines were tested in microcosms (0.5 kg soil): consortia of fungi and bacteria resulted faster and more efficient against the most recalcitrant pollutants than consortia made up exclusively by fungi or bacteria. The best 6 consortia were used for mesocosms (10 kg of soil) and the best performing consortium (total hydrocarbons content reduced up to 70 % in 3 months) was used to inoculate a of more than 530 ton of soil. The treatment was more efficient than the traditional approach: as regards the total hydrocarbon content, the removal was 38% higher than the control. The toxicity was even halved in comparison with the control. This report provides additional recognition about the possibility to apply bio-based solutions on polluted soils underlining how consortia of fungi, bacteria could overcome the limitations associated with their stand-alone applications. Trials against other pollutants and in different geographical areas indicate that the methodology could be successfully replicated in other environments.

**Fungi** grew in 96-wells plates using different pollutants as sole carbon source

**Fungi** grown on carriers ready to be inoculated in soil

*Trichoderma lixi* MUT 3171 growth on different pollutants as the sole source of carbon

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June 2020 IBBS Council meeting went on line....

This is a screen shot of the last IBBS Council meeting. 14 members joined on Skype, and it was a great success...
Reading post-apocalyptic fiction in an apocalyptic world
by Joanna Verran

I set up the Bad Bugs Bookclub (www.mmu2.ac.uk/engage/what-we-do/bad-bugs-bookclub) in 2009. Our group of scientists and non-scientists reads and discusses fiction that focuses on infectious disease. We meet about six times a year, in a pub, and our discussions as well as a reading guide are posted on the bookclub website: more than 60 books so far! So if you want to start your own Bad Bugs Bookclub, suggest a book for an existing bookclub – or just read one of the books, feel free to download, or get in touch.

Inevitably, the meetings held prior to and during COVID-19 lockdown have elicited comparison between the content of the novels and the experiences of members.

-In March, we read Fever 1793 (Laurie Halse Anderson, 2001) and related fiction and non-fiction publications about yellow fever. The face-to-face meeting took place in the Manchester Museum on World Book Day (March 5th 2020), to supplement the Museum’s exhibition on insects. The emergence of an epidemic whose mode of transmission was unknown resonated with us, as we anticipated the arrival of coronavirus, and lockdown.

-The Island (Victoria Hislop, 2005) was discussed during the UK’s National Science Week at a secondary school that had launched its own Bad Bugs Bookclub (March 11th). At that time, we were conscious of hand-washing, elbow-bumping and ‘flattening the [coronavirus] curve’, but were able to consider how the lack of treatment for leprosy affected the lives of those infected and their families.

-Back in Manchester (May 20th), a bookclub member suggested Eyes of Darkness by Dean Koontz (1981) as a relevant read. It had been touted as the book that predicted the coronavirus pandemic, but lacked sufficient microbiology for our purpose, so two more books were incorporated into the Zoom meeting - ‘Pale Rider’, an accessible non-fiction description of the 1918 influenza pandemic by Laura Spinney (2017) and Pale Horse, Pale Rider by Katherine Anne Porter (1937). Both of these books provided great insight into the epidemiology and sociological impact of a pandemic.

-Not Forgetting the Whale by John Ironmonger (2015) is set in modern day Cornwall in a village that manages to isolate and feed itself during an influenza pandemic (‘identical [virus] to 1918’). The author joined our Zoom meeting (July 8th). We were pleased to read a story of human kindness in times of difficulty, and could relate it to community behaviours during coronavirus lockdown. We were envious of the brief duration of the pandemic and the arrival of a vaccine.

The switch to Zoom proved surprisingly successful, enabling easier attendance from further afield, nationally and internationally. A trial Twitter discussion enabled unlimited numbers of participants, but posed its own problems of continuity and the unspoken understanding of a more formal conversation in a public space: the meeting comprised questions on a specific book (Pale Horse by Laura Spinney), posted at seven minutes intervals across an hour.

It has been really rather nice to see familiar faces during our Zoom calls, and carry on our discussions as normal. The novels we read helped us to think about the behaviour of both humans and microorganisms in a crisis. Our next meeting, on International Microorganism Day (September 17th), focuses on John Le Carre’s The Constant Gardener (2001).

Do get in touch if you want to talk about any aspect of the bookclub! (j.verran@mmu.ac.uk and@JoVerran)
NEWS: Natural Substances to Clean and Protect Paper Artworks

M. Di Vitōa and M.C. Sclocchib

aDipartimento di Scienze Agrarie, Università di Bologna ‘Alma Mater Studiorum’, Bologna, Italy; bICPAL Istituto Centrale per la Patologia degli Archivi e del Libro (ICPAL), MIBACT, Roma, Italy

Weakening of the structure of paper stored in unsuitable thermohygrometric conditions is caused by bacterial and fungal biodeteriogens. These microbial agents can cause chromatic alterations through the release of acids, weak pigments and/or melanins. The presence of dust can be a potential trigger point for biodeteriogen growth. Paper artworks require constant restorative actions to eliminate dust particles. Therefore, it is important to clean the paper before any restoration treatment in order to ensure good conservation.

Indoor fungal contamination in museums, libraries and archives may be pathogenic for humans, inducing allergies, toxic effects, and infectious diseases in both operators and visitors, especially in the immunosuppressed. Methods to decrease the fungal load are therefore important for the conservation of both artworks and human health. Scientific studies show that natural substances, especially essential oils and hydrolates, are potential microbicidal resources against viruses, bacteria and fungi. Several recent publications have reported the action of these natural compounds in the conservation of cultural heritage.

Hydrolates, also known as “aromatic waters”, are co-products of the distillation process used to obtain essential oils. A group of researchers from five Italian research centers (1) studied the effectiveness of GELYD, obtained from the association of gellan hydrogel, generally used as a cleaning agent for paper artworks, and hydrolates to clean paper without damaging either paper artworks or human health. Testing was performed on a total of 16 hydrolates against 3 fungal strains (Aspergillus sydowii, Cladosporium sphaerospermum, and Penicillium chrysogenum from the ICPAL collection). Two hydrolates (Monarda fistulosa, Citrus aurantium subsp amara) were identified as having the best in situ fungicidal action.

Our data indicated a new and interesting eco-innovative use of hydrolates, since GELYD can clean paper artworks and kill potentially harmful fungal cells on paper. Further studies to evaluate the fungicidal activity of volatile compounds released by GELYD in confined environments indicated that the GELYD made with the hydrolate obtained from C. aurantium var. amara was effective. (data in publication).

International Microorganism Day 2020

FEMS is working to establish 17 September as International Microorganism Day.

FEMS wants it to be an annual celebration of microbiology and an opportunity to promote the diversity and variety of microorganisms. This year in particular, FEMS is making an effort to promote the positive contributions of microorganisms in our daily lives. You can find more information on the website https://www.internationalmicroorganismday.org/

We, as IBBS, ask your assistance in making this an unmissable event and the biggest celebration of microbiology to date.

FEMS is also seeking potential speakers for a programme of webinars, to take place on the day, discussing the wonders of the microbial world and on the specific topics below:

- Microbiology and Industry;
- Microbiology and Sustainability;
- Microbiology and Bioeconomy;
- Sourdough Culture, Brewing Yeasts, Plant Root Microbiome, Gut Microbiome, Microbes in Teaching and Education, Microscopy, Microbial Ecology, and of course Covid-19

FEMS and IBBS hope to bring together scientists, science communicators, applied microbiologists, researchers and those in industrial applications to reflect the diversity of microbiology and microbiologists.

We all want to provide “24 hours of microbiology” with videos on these topics (and many others) across the whole day. If you have any suggestions of speakers or additional topics, we’d be very keen to hear them and would be happy to give more information and speak to them directly.

Remember that....

IBBS is a member of FEMS

FEMS is the Federation of European Microbiological Societies (FEMS)

FEMS is an international organization formed by the union of a number of European scientific organizations.

Read the the latest news: https://fems-microbiology.org/news/


Here is the link to the last FEMS affiliates letter: https://mailchi.mp/fems-microbiology/n16x1i56zz-2636630?e=b023dea76b

Members of FEMS Member Societies can apply for grants for research and training, or for support when organizing or attending a meeting – including our Member Societies’ national and regional congresses. Every year FEMS supports meeting organizers and early career researchers and enables experts to share ideas and promote excellence in science.
IBBS initiatives dedicated to the International Microorganism Day 2020 (IMD 2020)

IBBS members will present webinars on the 17th September in the framework of FEMS 2020 International Microorganism Day, live stream across 24 hours (the 24 hours run from 22:00 CET 16th September to 22:00 CET 17 September). Each speaker will be delivering a short 20-minute talk in via Zoom call streamed to webpages and social media accounts.

Currently the proposed webinars by IBBS members are:
1) by Frederick J. Passman, IBBS Vice President, President Biodeterioration Control Associates, Inc., Princeton, New Jersey, US
   Title: The dark side of industrial microbiology – when microbes damage industrial fluids and the systems in which they are contained.

2) by Benjamín Otto Ortega Morales, IBBS Representative in Mexico, Coordinador del Departamento de Microbiología Ambiental y Biotecnología, Coordinador Académico de la Maestría en Biociencias Aplicadas. Universidas Autônoma de Campeche (Mexico)
   Title: Overcoming a toxic relationship: antimicrobial nanomaterials and biofilms.

More details on the initiative will be provided on the IMD and IBBS websites. Therefore ...stay tuned!

https://www.internationalmicroorganismday.org/
https://www.ibbsonline.org

IBBS Bursaries

The IBBS Council offers bursaries, up to £1,000 each, in support of both undergraduate student projects and postgraduate student research.

Postgraduate applicants must be members of the Society, in good standing (dues paid), working in higher education or research institutes.
Undergraduate applicants must be sponsored by a faculty member who will supervise the applicant. Projects must be related to biodeterioration or biodegradation.
Research must be completed either in the applicant’s (i.e., supervisor’s) laboratory, or another laboratory that has agreed to accept the candidate without fees. Deadlines for bursary applications

Bursary applications will be considered two times per year.

For proposed start dates between 1 July and 1 December
Deadline: 1 March

For proposed start dates between 2 December and 30 June
Deadline: 1 October
Membership Renewal

In case you still haven’t renewed your annual subscription to the International Biodeterioration & Biodegradation Society (IBBS), please do so as it expired last December!

Our current membership rates (mostly unchanged) are as follows:
- Ordinary Membership - £47.50
- Student Membership - £12.50
- Retired Membership - £12.50
- Online Journal Subscription * - £40.00
- Hard Copy Journal Subscription * (delivered by post) - £60.00
- Lifetime Standard Membership - £475
- Lifetime Retired Membership - £125

* Includes all member benefits and access to 10 copies per year of International Biodeterioration & Biodegradation.

To renew, visit www.ibbsonline.org/membership, log in using your email address and password and click on “renew membership”.

If you have forgotten your password, click on the big green JOIN IBBS button, or use this link, www.ibbsonline.org/ibbsmember/signup, and follow the instructions.

Payment is by credit/debit card or PayPal.

If you have a problem, please email: membership@ibbsonline.org.

IBBS is the only scientific society for scientists working in the fields of biodeterioration, biodegradation, bioremediation and associated disciplines!

What we offer:
- Reduced registration rates at Society meetings and the joint meetings that we hold with other organisations and societies.
- Eligibility for awards and bursaries, to support small research projects and meetings, including student bursaries. (More info here: https://ibbsonline.org/bursaries/)
- As an affiliated society of FEMS (Federation of European Microbiological Societies), members can receive FEMS research grants and funding to attend conferences.
- An extensive and informative website (www.ibbsonline.org) with details of forthcoming meetings, the ability of members to publicise meetings and conferences that they are organising or involved with.
- Special rates for Society publications and resources.
- Regular member contact via our newsletter “IBBS World”, and frequent updates through our website and email network.
- Regular Society meetings and conferences - e.g. our triennial symposia - IBBS 18 in Bozeman, Montana, USA in 2021, is a three to four-day showcase event of the Society, although we usually have at least one shorter meeting each year, normally on a specific topic. (More info here: https://ibbsonline.org/meetings/)
