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CSEA NEWS & VIEWS

The Official Newsletter for the California Society of Environmental Analysts

WELCOME BACK!

Welcome to the third edition of the California Society of Environmental Analysts newsletter! We have a brief newsletter for you that seems to have naturally grown around the various critters in our laboratory world.

As always, we encourage each of you to participate actively. Become a member! Navigate to our Members Forum to share ideas and thoughts. Ask questions. Let's share our knowledge so we can all be better analysts and environmental stewards.

TRUTH OR DARE: THE 5-SECOND RULE

As I was sitting at my desk to edit this newsletter, I dropped a piece of my lunch onto the floor. Nooooo! Can I pick it up and eat it anyway? I'm not certain I've stepped in that spot yet today, so it might be safe. There must be some truth to the five-second rule, right? I picked up the fallen piece of chicken-less patty and set it aside to dispose of later. It made me wonder though, do any of our members have experience with this type of testing? What would you share with us about the popular myth? I've copied this same question to our Members Forum, so if you have any insight, please respond on the Forum!

Wishing you all a joyous holiday season!

Rachel Van Exel

CSEA Vice President

INSIDE THIS ISSUE:

CSEA PRESENTS A NEW SERIES...

TECH TALK

We keep saying it- we want to share knowledge with each other, so we're starting a technical series for just that.

Our new **Tech Talk** will consist of a brief presentation by an expert on a technical topic and then plenty of time for Q&A and open discussion with attendees.

Join us!

January 26, 2023
12 PM - 1 PM PST

Chemistries of Hazardous Waste
with
Paul Canevaro of US Ecology

Stay tuned for more details via email.
If you haven't already subscribed to our email distribution, do so now!

calanalysts.org

ELAP UPDATE...
READY FOR LAUNCH!

CSEA BOARD MEMBER

Christine Soteto,

Chief, California ELAP

January 1, 2024 is approaching soon, the date California ELAP's new regulations to implement "TNI minus 2" will be effective.

We are excited to see all the progress our laboratory community has achieved in their laboratories.

Our goal is to help laboratories with the tools they need to succeed in compliance of our new regulations, so we contracted with A2LA Workplace Training to offer TNI documentation training classes. All of the trainings have already taken place, but you can still watch the training on our CA ELAP YouTube page (https://www.youtube.com/@caelap) and receive free TNI documentation templates by emailing elapca@waterboards.ca.gov to help you comply with the new regulations.

We know some laboratories still need help, and we will focus some of our 2023 California ELAP conference on compliance of the new regulations. Our tentative theme this year is Ready for Launch in anticipation of the new regulations deadline.

We also know many of our laboratory community members are early TNI adopters, and we want to celebrate them and their hard work. To that end, we developed a program to recognize these early adopters and their achievements by issuing official certificates of achievement from CA ELAP.

We are excited to see so many of our laboratories making huge strides in their TNI journey!

CALIFORNIA
Water Boards
STATE WATER RESOURCES CONTROL BOARD
REGIONAL WATER QUALITY CONTROL BOARDS

WHOLE EFFLUENT TOXICITY TESTING
– SPECIES SELECTION CONSIDERATIONS

CSEA BOARD MEMBER

Katie Payne,

Enthalpy Analytical

Our bioassay lab works with a variety of marine and freshwater species. The test organisms used for a particular effluent testing program are usually based on an approved list in the National Pollutant Discharge Elimination System (NPDES) permit as well as the availability of the test organisms or potential seasonal alternates.

When considering which species get used for a given program, there are several considerations. For example, are the organisms native or relevant to the receiving environment? Can they be easily cultured or collected? Do we understand their life histories and know how they typically respond to common toxicants? Is there a standardized test exposure method?

Most NPDES permits also include species sensitivity screening, in which a vertebrate, invertebrate, and an aquatic plant are tested to determine which species demonstrates the greatest effect. The most sensitive species is then typically used for ongoing monitoring.

Below are some examples of commonly used test species.

Freshwater species

Fathead Minnow
Pimephales promelas

Green Algae
Selenastrum capricornutum

WHOLE EFFLUENT TOXICITY (CONTINUED)– TEST SPECIES

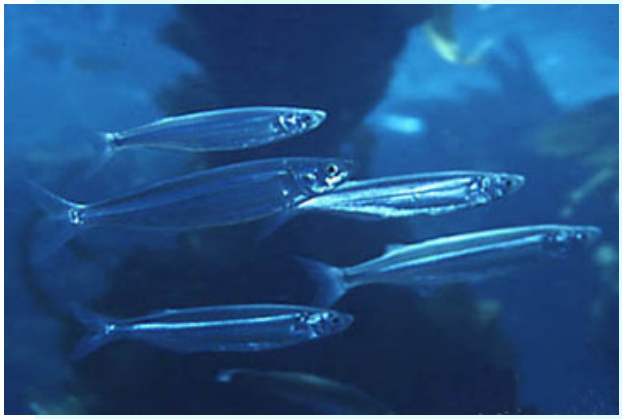
Rainbow Trout
Oncorhynchus mykiss

Water Flea
Ceriodaphnia dubia

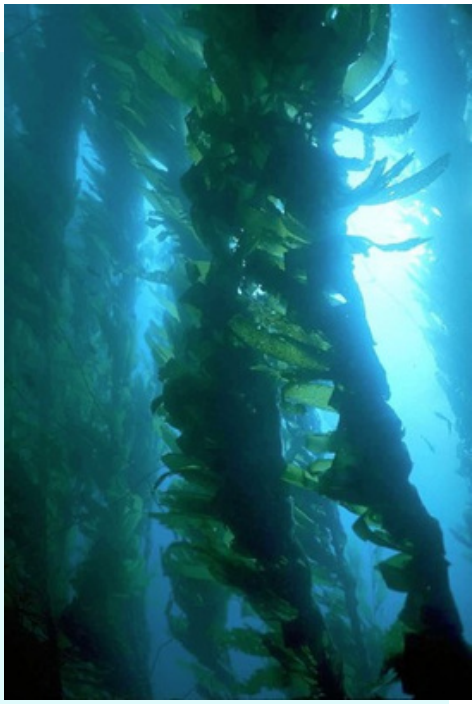
Water Flea
D*aphnia*

Amphipod
Hyalella azteca

Marine species



Pacific Topsmelt
Atherinops affinis



Giant Kelp
Macrocystis pyrifera

Mysid Shrimp
Americamysis bahia

Inland Silverside
Menidia beryllina

Red Abalone
Haliotis rufescens

WHY TEST FOR BACTERIA?

Carolyn Ruttan

CSEA President

In my world of a very small lab, I service the local wastewater and drinking water treatment plants for some of their microbiology needs, particularly bacterial testing. So why do we analyze water for bacteria? Because bacteria may do harm to public health and the environment. Since 1971, the Centers for Disease Control (CDC) and the USEPA have collected reports on disease outbreaks and waterborne diseases. This has led to legislation providing drinking water standards for public health. I wanted to know a little more to appreciate the responsibility I have and the part I play in determining water quality with respect to bacteria.

Over human history, bacteria have earned a negative reputation since they have caused many human deaths. It should be pointed out that bacteria, specifically cyanobacteria, gave rise to oxygen in our atmosphere, and still do, contributing 30% to the world's oxygen, so not all are harmful. Indeed, bacteria have colonized almost every environment in the world, including the human body. In the human body, there are more bacterial cells than there are body cells, accounting for up to 0.2 kg of our weight. Most of these bacteria carry out a vital service such as aiding in digestion, producing nutrients, vitamins K and B12, and conferring immunity from pathogens. We need bacteria to lead a healthy life.

Then, there are the pathogenic bacteria. Here are just a few from CDC's website. The pathogenic ones are not always harmful- many bacteria are opportunistic pathogens waiting for the right time and place.

Disease	Causal Bacterium	Vaccination	US deaths/yr
Infectious colitis	Clostridioides difficile	No	12,800
Anthrax	Bacillus anthracis	Yes (limited)	0
Meningococcal meningitis	Neisseria meningitides	Yes	30
Tetanus	Clostridium tetani	Yes	7
Tuberculosis	Mycobacterium tuberculosis	Yes	500
Scarlet fever	Streptococcus group A	No	190
Hemorrhagic colitis	Escherichia coli O157:H7	No	75

BACTERIA (CONTINUED)

Disease	Causal Bacterium	Vaccination	US deaths/yr
Typhoid fever	Salmonella enterica ssp Typhi	Yes	0
Plague	Yersinia pestis	No	0
Syphilis	Treponema pallidum	No	35
Gonorrhoea	Neisseria gonorrhoeae	No	0
Diptheria	Corynebacterium diptheriae	Yes	<2
Cholera	Vibrio cholerae	Yes (limited)	0
Lyme disease	Borrelia burgdorferi	No	0
Shigella	Shigella spp.	No	0
Salmonella food poisoning	Salmonella spp.	No	420
Gastroenteritis	Campylobacter jejuni	No	0
Nontuberculous Mycobacteria	Mycobacteria spp.	No	3,800
Legionnaire's disease	Legionella pneumophila	No	995
Multi-drug resistant PA	Pseudomonas aeruginosa	No	2,700
Whooping cough	Bordatella pertussis	Yes	10
HIB	Haemophilus influenza	Yes	470
Listeriosis	Listeria monocytogenes	No	260

So, it is easy to see the need for water testing in terms of bacterial presence, but why pick total coliform and E. coli for identification as the basis for public health analysis? Isolating all pathogens from a water sample is impractical so decades ago we chose to identify coliforms to indicate the presence of unsanitary conditions and presence of enteric pathogens. People suffering from bacterial diseases shed the bacteria in their stool along with coliform bacteria. Coliforms are usually present in water contaminated with human and animal feces and often associated with disease outbreaks.

Coliform is not a taxonomic group- it is a convenient way of describing some of the bacteria that naturally live in animal intestines. Coliforms account for a small number of the over 1,000 bacteria species in the human gut. Coliform bacteria generally belong to four genera of the Enterobacteriaceae: Citrobacter, Enterobacter, Escherichia and Klebsiella . These genera ferment lactose, producing acid and gas when incubated at 35-37 ℃ and they produce the enzyme β-d-galactosidase. These facts make coliforms easy to identify.

BACTERIA (CONTINUED)

Escherichia coli or E. coli is a coliform and is both pathogenic and non-pathogenic depending on the strain. Known since 1884, it is probably the most studied bacteria because it is easy to grow, its genome has been sequenced and it is used in molecular cloning, recombinant protein production, biotechnology, vaccine production, bioremediation and biofuel production. Non-pathogenic E. coli lives in the large intestine of animals where it has an important role in digestion and disease immunity. Most E. coli produce the enzyme β-glucuronidase, another easily identified enzyme. E. coli is always present in human and large mammal feces, whether they are healthy or sick and E. coli does not naturally grow outside the intestine, although it can exist in the environment, in particular water, for as long as pathogenic bacteria such as cholera and typhoid fever. These facts make E. coli a good indicator of pathogenic bacteria.

Unlike chemical analysis, microbiological analysis is inherently variable because we are trying to pin down the presence of a particular group of living organisms that we want to grow. Bacteria increase in number by binary fission every 12 minutes to 24 hrs (a single bacterial cell could produce one billion cells in 7 hours). Hence, microbiological examination takes a while to be sure that bacteria, when present, are given every chance of replicating to a number that can be identified because we have zero tolerance for bacterial presence in drinking water.

Is there something you'd like to see in the next CSEA newsletter? Have a resource to share? Let us know!

Email us at info@calanalysts.org

Connect with the CSEA Community!

calanalysts.org

calanalyst Vendor TABLE

The following businesses are vendor members associated with The California Society of Environmental Analysts (CSEA). If you are interested in becoming a member with CSEA please join on our website. You can learn more at calanalysts.org/vendors.

FIA Lab

Fluidics Intelligently Automated

FIALab Instruments is a leading manufacturer of flow injection analysis (FIA) and sequential injection analysis (SIA) instrumentation. These instruments are used to automate and streamline many liquid-handling procedures. Beyond instrumentation, FIAlab also specializes in software development – including custom work.

Visit FIALab website email: Sales@flowinjection.com

A2LA WorkPlace TRAINING

A2LA WorkPlace Training (AWPT) is a non-profit organization dedicated to providing the highest-quality professional training and consulting services in the fields of management systems, conformity assessment, and precision measurement.

Visit A2LAWPT website email: mwade@A2LAWPT.org

SyringeFilter.com

SyringeFilter.com, LLC was established by two owners that work in and with laboratories closely, having well over 40 years of combined experience. Noting the need for assorted syringe filters in many labs, they developed a way to manufacture a fine quality product at a very reasonable price.

Visit SyringeFilter.com website email: sales@syringefilter.com

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Visit Clinisys website email: info-us@clinisys.com

A2LA

AA2LA, the American Association for Laboratory Accreditation, is dedicated to the formal recognition of competent testing and calibration laboratories, medical laboratories, biobanking facilities, inspection bodies, product certification bodies, proficiency testing providers, and reference material producers.

Visit A2LA website email: jkeyser@a2la.org

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