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TESTIMONY IN SUPPORT OF:

LD 1982 *"An Act to Ensure Uniformity in the Regulation of PFAS"*

THE JOINT STANDING COMMITTEE ON ENVIRONMENT AND NATURAL RESOURCES

Senator Tepler, Representative Gramlich, and distinguished members of the Committee on Environment and Natural Resources, my name is Amy Arata and I represent House District 104, which includes New Gloucester and part of Gray. It is my pleasure to present to you LD 1982, *An Act to Ensure Uniformity in the Regulation of PFAS.*

Although I am not a chemist, I have familiarity with chemistry and molecular biology. I graduated as an honor's scholar from Gordon College in Massachusetts with a degree in Biology, followed by a Masters degree in Genetics from the University of California, Davis. I worked at the university in various departments including the Veterinary Medicine Department of Pathology, Microbiology, and Immunology, where I developed a test to distinguish various bacteria using multiplex polymerase chain reaction, and had the honor of publishing my research.

PFAS stands for Polyfluoroalkyl Substances. When I first heard this around 2020, it caught my attention because the word "substances" is very broad and not a word that is typically used in chemical nomenclature. Upon further investigation, I found the definition in Maine to be extremely broad, lacking in the precision that we typically see in science. My constituent, an agronomist, let me know that other states and the federal government have a slightly narrower definition of this chemical family, and that Maine farmers will be at a competitive disadvantage as they try to protect their crops from pests. This bill is merely a refinement of the definition of PFAS. It does not change the important work that you've already done on this issue and will require no other changes in statute. This refined definition is based not only on the chemical formula, but also on the interplay of chemistry and molecular biology. It recognizes the relationship between molecular structure and function as it impacts human health.

Maine's definition of PFAS requires only one fully fluorinated carbon atom in order to be considered a dangerous PFAS. However, this definition encompasses many chemicals that are not dangerous, which I will illustrate in a moment. LD 1982 will match the definition of PFAS adopted by the United States Environmental Protection Agency under the Biden administration. Although narrower than Maine's definition, it is still extremely broad. It is as follows:

Any chemical substance or mixture containing a chemical substance that structurally contains at least one of the following 3 substructures:

A. R-(CF2)-CF(R')R", where both the CF2 and CF moieties are saturated carbons;

B. R-CF2OCF2-R', where R and R' can either be F, O or saturated carbons; or

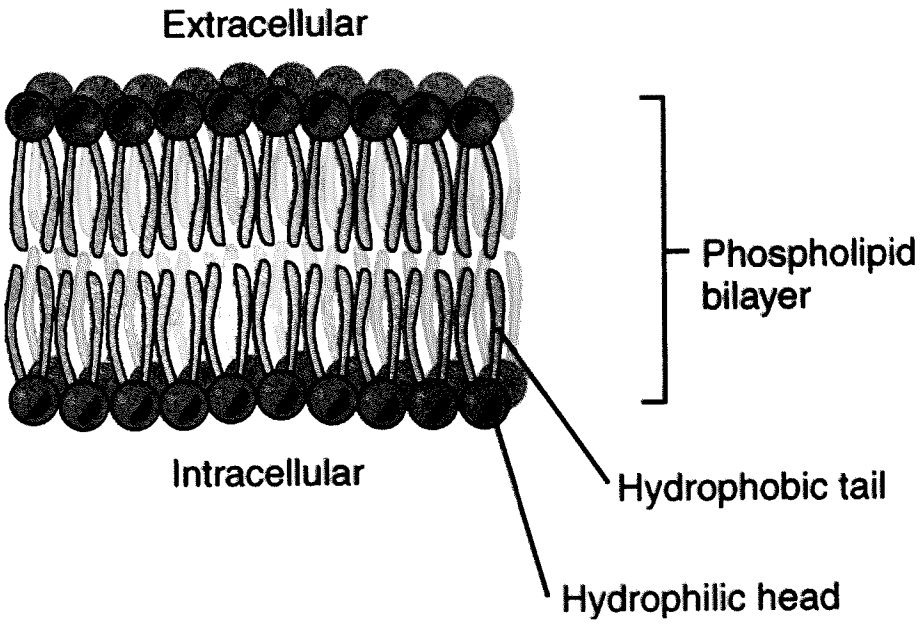
C. CF3C(CF3)R'R", where R' and R" can either be F or saturated carbons.

In organic chemistry, "R" is a placeholder that represents a generic substituent group or the remainder of a molecule. It's almost like saying "*et cetera*". Therefore, this definition includes thousands of molecules, including perfluorooctanesulfonic acid, which is of particular concern. However, it acknowledges the fact that a single fluorinated carbon moiety is chemically and structurally distinct from well-studied polyfluorinated alkyl substances such as perfluorooctanoic acid, which has 8 fluorinated carbon atoms and was used in Teflon and in Aqueous Film Forming Foams to fight fires.

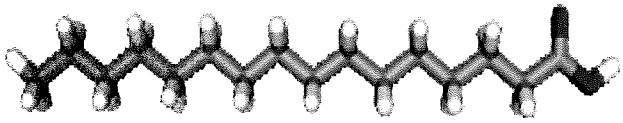
Note that the EPA's definition of PFAS, which I recommend in this bill, is not the broadest or least restrictive definition in use. Other organizations, such as the Administrative Council on Toxics Use Reduction and the Organisation for Economic Cooperation and Development, recommended a definition that requires a chain of at least three fluorinated carbon atoms, while the EPA definition requires two.

Epidemiological research shows that longer chain polyfluorinated chemicals present in water can cause harm to humans. In order to properly regulate these chemicals, it's important to understand the molecular mechanism by which they cause harm.

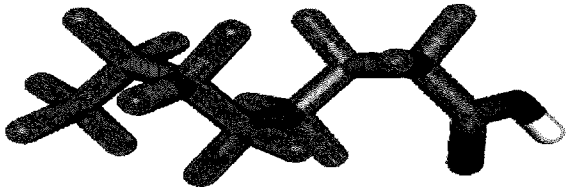
Unlike many other environmental hazards, the function of polyfluoroalkyl chemicals in the cell has not been well elucidated. However, the most accepted hypothesis is that it mimics the fatty acids that comprise the phospholipid bilayer of cell membranes. Fatty acids have a saturated carbon "tail" which is hydrophobic and forms the interior of membranes. Similarly, polyfluorinated carbon chains also have a hydrophobic "tail", which allows it to access membranes and interfere with various cellular signaling and transport mechanisms.



The most common fatty acid in the human body is Palmitic Acid, which has a 16-carbon hydrophobic chain: (pubchem.ncbi.nlm.nih.gov) (red- oxygen, white- hydrogen, gray - carbon)



Similarly, the dangerous PFAS, Perfluorooctanoic acid has an 8-carbon hydrophobic chain: (green- fluorine)



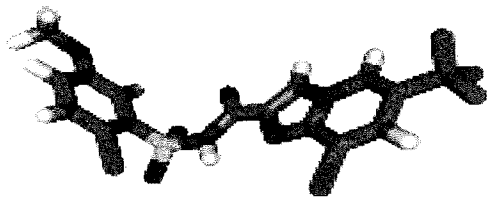
In light of this hypothesis, the EPA's definition of PFAS as having a chain of 2 or more fluorinated carbons is reasonable. However, under Maine's definition, any molecules that have merely one fluorinated carbon are defined as dangerous PFAS. Some of these have been safely used for years to promote health. For example, there are 360 organofluorine pharmaceuticals that have been approved and used globally between 1954 and 2021. Many of you are familiar with Prozac (fluoxetine), Flonase (fluticasone propionate), Cipro (ciprofloxacin), Celebrex (celecosib), Lipitor (Atorvastatin), Celebrex, and the Covid -19 drug, Paxlovid. Including Lipitor on this list is particularly ironic because certain PFAS has been shown to raise cholesterol, but Lipitor is a medication that reduces cholesterol. Also ironically, there are many chemotherapy drugs that have one fluorinated carbon atom, yet certain types of PFAS have been linked to cancer.

The fluorine-carbon bond is one of the strongest single bonds in chemistry. That's why it's called colloquially a "forever chemical" and may be the reason why this overly-broad definition was developed in the first place. This long-lasting bond is useful for stabilizing chemicals in a way that's required for many pharmaceuticals and materials to function properly, but doesn't necessarily mean that it's harmful. The fluorine-carbon bond resists degradation, oxidation, and attack by various reagents. It influences the shape of the molecules, affecting their biological activity and reactivity with other molecules, making them effective

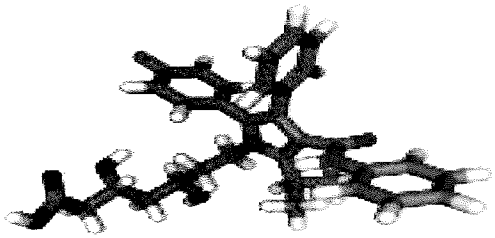
Chemicals necessary for agriculture are caught under Maine's broad definition, but not under the federal definition. Salibro (fluazaindolizine) is a common nematicide that is licensed in most other states. We need it to keep worms out of our food. By having a different definition of PFAS, Maine farmers won't be allowed to use the same pesticides as other states, and will be at a competitive disadvantage. In fact, in order to afford food, we will have to import it from the states that use the DEP's definition of PFAS.

As you can see below, the chemical structures of these molecules are very different than that of perfluorooctanoic acid.

Salibro: (bright green – chlorine, light green – fluorine, yellow – sulfur, blue- nitrogen, red – oxygen, white – hydrogen, gray – carbon)



Lipitor:



When available, Maine requires use of a functionally equivalent alternative chemical to those defined as PFAS. However, this is not always as simple as it sounds. Many of us know people who have used a product or medication that worked well, only to be told that due to insurance coverage limits they would have to change to a biosimilar medication. It supposedly treated exactly the same ailment and was functionally equivalent, but didn't work as well or had different side effects. The same can be said for substitution in other products. Also, keep in mind that even if medications and other unavoidable uses of chemicals that fall under Maine's broad definition of PFAS are allowed, these same chemicals will inevitably be found in wastewater and will eventually enter water resources.

By refining the overly-broad definition of PFAS, LD 1982 will reduce the work load of the Maine Department of Environmental Protection. It will allow the department to have more focus in their work as they evaluate the thousands of chemicals that will still be defined as PFAS under LD 1982, and determine which ones have an unavoidable use. Between making these determinations and complying with record-keeping requirements regarding PFAS, the department will need more staff, and the state may not have the funds to appropriate for this purpose. By achieving uniformity in the regulation of PFAS, the department will be able to collaborate with other states as well as the federal government in regulation of PFAS.

I urge the committee to pass LD 1982 because it will protect the health of Maine citizens while also allowing our farmers and other industries to be competitive nation-wide. Thank you for your consideration and I am happy to answer any questions.

Respectfully,

Amy B. Arata

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State Representative