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THE FOURTH PHASE OF WATER

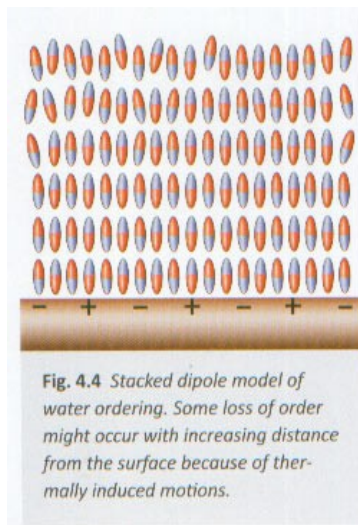
part two

by Miles Mathis

One of my readers was kind enough to send me a copy of Gerald Pollack's book, so that I could continue this analysis. [In part one](#) I looked at Pollack's first chapters and his last. Here we will study the middle chapters. In that first paper, I supported the main thesis and broader arguments of Pollack, including his belief in structured water, saying that even if he went completely off the rails in the middle of the book, he is still worth reading. I stand by that, but have found he does go off the rails a bit. It is in the details that he leaves the right path, so the main argument of the book is not much affected. But it is worth looking at these details closely, especially for my readers.

In section two, Pollack takes the data of section 1 as given and begins to try to find a structural explanation for this data. He immediately fixates on the hexagonal structure of water/ice, and in doing so he ignores other possibilities. This fixation also leads him to begin to push data into diagrams in some pretty hamhanded ways, as we will now see.

The only other diagram Pollack considers briefly for structured water is the diagram of his mentor Gilbert Ling. This is the stacked dipole model.



He ends up dismissing it for only one reason:

The exclusion zone bears net electrical charge. Dipoles remain neutral; they cannot build up to yield extensive zones with net charge. [p. 51]

Using the current naïve model of dipoles, that is true. But with dipoles caused by charge channeling, it

is not true. When I say the current model is naïve, I mean it is just an egg-shaped model of the molecule with one end labeled plus and one end labeled minus. In that case, you seem to have an equal separation of equal charge, which would sum to neutral. But since we now know the dipoles aren't created that way, we can go into the structure and see how charge *channeling* causes the dipoles and the alignment. Since we are dealing with a charge stream, the minus is now assigned to where the charge goes into the nucleus, and the plus to where it comes out. If we align these poles like plugs and sockets, we can track the motion of charge through the substance. Although our substance may be less charged than other substances that conduct better, it doesn't have zero charge. It is never neutral. It is only more or less charged, depending on how well (and how linearly) it channels. Any substance that is channeling in one direction more than others will not be measured as neutral, no matter where in the substance you measure. Since in the experiments of Pollack the charge is moving out from the surface into the bulk water, he should never expect to measure neutrality in the zone in between, no matter what model he chooses.

So the problem is not really with Ling's dipole model, it is with Pollack's *expectation* that this model implies neutrality. It doesn't. If we fill the dipole model in with a bit more structural detail (as I did in the previous paper), we find that it doesn't contradict Pollack's experiments at all.

Next, Pollack suggests a hexagonal structure for EZ water, and compares it to hexagonal ice. Unfortunately, he says, this ice is charge neutral. To solve this, he suggests removing some of the protons in the 3D structure, making EZ water both planar and charge negative. But he skips over why the ice is charge neutral to start with. Without understanding that, the rest of this just looks like a push to match data. In fact, ice is charge neutral only in situations where water is more charge neutral: that is, when it is in a bulk state. Pollack fails to tell you that ice also has an EZ state, where its charge channeling is increased, giving it more charge. In other words, ice isn't strictly neutral near a surface, and if that surface is of a certain sort, the ice is less neutral. This is explained by charge channeling, but Pollack ignores it altogether. It is explained by charge channeling because, again, the charge has to be moving out from the surface through the ice. Because ice is in a 3D hexagonal pattern which gives us longer charge paths through the ice, and because ice is colder which gives us lower charge densities, it will measure more neutral than water. *But it will not measure as neutral.* It will show less charge, but not *no* charge. Therefore, all this talk about neutrality is mostly misdirection.

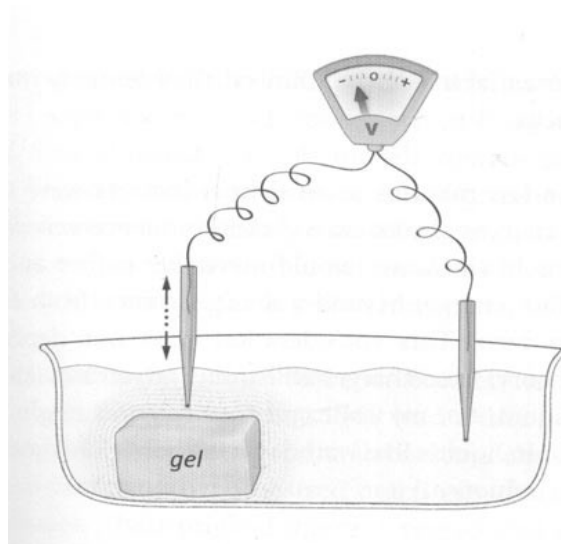
To see this in more detail, let's look at how Pollack puts it on p. 52:

The literature on water fell overwhelmingly on the side of its neutral charge, and the familiar dipole model also implied a zero net charge; all of our scientific experience left us confident that an uncharged region was more likely than a charged region.

That's an example of very sloppy thinking. Since the literature he is talking about is based on (bad) guessing and not on experiment, that literature is beside point. As is the naïve dipole model, as I have already shown. All these previous guesses were based on very poor models, so they are practically worthless. Such literature and models don't even count as "scientific experience." Scientific experience should be based on hard data and rigorous mechanical models, so his "confidence" in an uncharged region is misplaced. Therefore, finding charge in this region shouldn't point him toward his new model, but he implies it does. He implies that finding charge is strong proof of his model and strong disproof of previous models. But it isn't. Finding charge is only proof that the old definitions of charge were very poor, and that the expectations of neutrality were just bad guesses.

Even Pollack's experiment showing neutrality in the bulk water is off, proving that, like the

mainstream, he doesn't understand what charge is. He gives us this diagram to show neutrality:



With the second microelectrode in bulk water, the meter should read zero, and did. That means there is no current running through the wire, which the mainstream (and Pollack) takes to mean that the ion density in the water is the same as in the gel. If we were only dealing with negative ions, it would mean both substances have the same density of free electrons, giving us no potential difference and no reason for the electrons to travel through the wire. However, I hope you can see that explanation makes no sense, since bulk water and gel shouldn't have the same ion densities regardless of what ions you are looking at. Since they are very different substances, they *can't* have the same charge or ion densities. If ion densities were the cause of the charge neutrality, we couldn't then move the microelectrode closer to the gel, finding negative charge there. If the two substances are neutral relative to one another, and they are connected by the central substance, then after any amount of time the central substance must also be neutral. Since we find that it isn't, the neutrality can't be caused by charge or ion densities.

In other words, if we define neutrality in the current way, there is no way to explain why the gel is emitting anything, charge or ions. To create the EZ, the gel obviously has to be emitting ions into the water. But if we define potentials the way they are currently defined, there is nothing to cause that emission. Since the gel and bulk water are neutral to one another, and no current is flowing above in the wire, why is anything flowing below in the EZ? What potential exists to pull charge and thereby ions out of the gel and into the water, passing through the EZ?

These experiments, taken together, don't just tell us that the dipole theory is wrong. They tell us the charge theory is wrong from the foundation. Since it is not charge or ion density differentials that cause current, it must be something else. It must be charge *motion*. What I mean by that is, we are finding neutral charge in the bulk water and the center of the gel because in those spots the *summed* charge field has no direction. Charge is moving in all directions, but it is moving left as much as right and up as much as down. That is what charge neutrality is. In the zone between them, we aren't finding neutrality because in that zone the summed charge is moving from left to right. It is moving *out* of the gel and *into* the water. It is this motion we measure as charge.

This may be the most important part of this paper, and although I have taught you this before*, I want to pause and stress it again here. The mainstream has assumed—against much strong data—that

potentials are caused by charge or ion densities, but as we have just seen they are caused by summed charge *motion*. This is another thing the mainstream sometimes knows, but chooses to ignore most of the time. For instance, the mainstream has ways of measuring charge and ion densities, so it knows full well that the bulk water and gel don't have the same number of photons or free electrons or anything else. If they measured the electron affinity or electronegativity or "blackbody radiation" of these substances, they would see they weren't equal. We know they don't react to applied current the same, don't act the same as capacitors, etc., so why would we think their neutrality would be caused by equal ion densities?

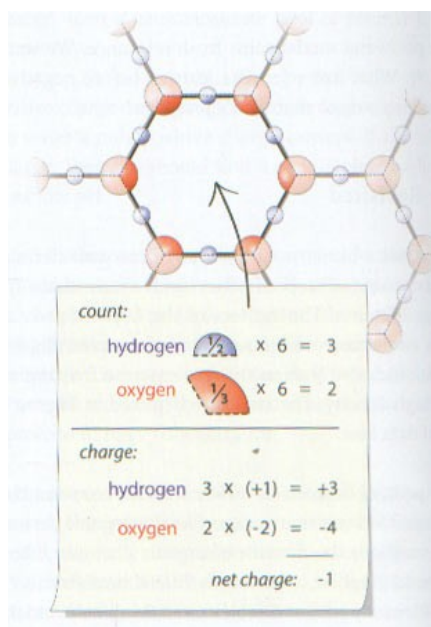
You will say, "I don't see why, that being so, a potential difference wouldn't be set up between the water and gel. What does motion have to do with it?" I can answer that by just looking at one end or the other. Let us go into the bulk water and see why it is acting neutral relative to the gel. If, as I have said, its neutrality is caused by no net motion of charge at the point of the microelectrode, that just means that no charge is entering the wire because it has no reason to do so. There is no net vector to cause the charge to enter the wire. But if we gave the summed charge a net vector either right or left, say, that vector could be used to drive charge into the wire, and through it. Supposing the net vector on the other end of the wire was in the same direction (or null), the charge could pass all the way through and come out in the gel. In that case you would have current, because the charge would carry with it any free ions. If the ions were electrons, you would have a negative current. If protons, positive.

Simply by staying mechanical (and particulate) at every point, we can clear up many mainstream problems, including the problems Pollack is encountering in his book.

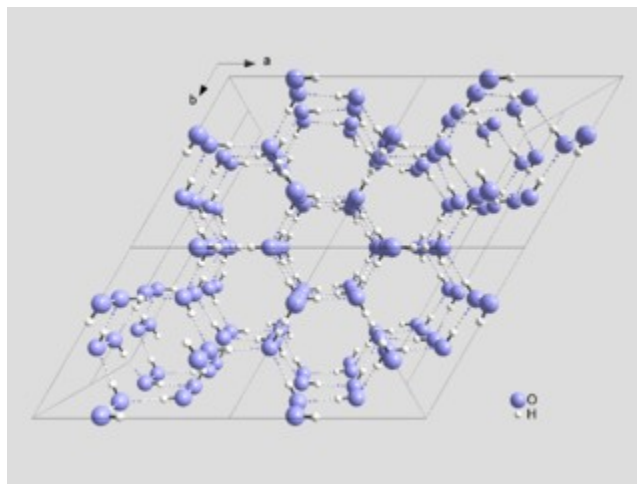
Amazingly, Pollack even shows you an experiment which contradicts his previous experiment, and he does it on the very next page. Instead of measuring charge neutrality with a current meter, he measures it with a pH meter. He finds that the bulk water beyond the EZ is highly acidic, which of course means it *isn't* neutral. If it contains a lot of free protons, as he says, it can't be charge neutral, can it? This proves that the previous experiment with the microelectrodes wasn't indicating anything about the neutrality of the bulk water. All these experiments simply indicate the gel is releasing protons into the water. The movement of the protons left to right through the EZ is read as negative charge, but is read as neutral in the bulk water since the strong left to right motion is finished. The protons out there aren't directionalized, so although they read as acid, they don't read as "charge."

But Pollack completely misreads this data. He says, "Apparently, as the EZ builds, water's charges separate into negative and positive components." No, as I just showed you, there is a better and more mechanical explanation, and it does not involve separation of charges. It involves *motion* of charge and ions through the substances. We don't track sloppily defined potentials, we track physical winds of charge.

But it gets worse. Pollack then brings in Lippincott's 1969 paper at *Science*, using it as ballast for his own theory. Lippincott had also used a hexagonal structure to explain polywater, and Pollack takes that as confirmation. It isn't, because both Lippincott and Pollack require a massive push at this point to continue to match data. Here is Pollack's next important diagram:



That doesn't work, because it conflicts with many things, including the current structure of hexagonal ice:



That is the mainstream diagram of normal ice, which also has three bonds out of each Oxygen. But in neither case are we told how that third bond is mechanically created. With ice, we are told the third bond is a Hydrogen bond. But that is just a name. When you ask for mechanics, you get something like this, from Wikipedia:

The electronegative atom attracts the electron cloud from around the hydrogen nucleus and, by decentralizing the cloud, leaves the atom with a positive partial charge. Because of the small size of hydrogen relative to other atoms and molecules, the resulting charge, though only partial, represents a large charge density. A hydrogen bond results when this strong positive charge density attracts a lone pair of electrons on another heteroatom, which becomes the hydrogen-bond acceptor.

And you wonder why students aren't satisfied with answer like that and are looking for something better. That tells you nothing. *Nothing*. It is nothing but a series of fudges. They need a Hydrogen atom—which should only bond once according their own theory—to bond twice; so they just make it

so. To start with, the primary bond between the Oxygen and Hydrogen is a covalent bond, which according to mainstream theory creates stability by sharing electrons. However, this theory has always been a non-starter, as I have shown, since you can use this non-mechanical theory to explain anything. Because it has no real content, it can be pushed any old way. Via the covalent bond, Hydrogen can bond either to itself or to Oxygen, although Hydrogen normally ionizes positive and Oxygen normally ionizes negative (oxides). No sensible mechanics has ever been offered for this, which is why we see the insensible push of “cloud decentralization” above. Although the Hydrogen atom was already stable according to the current definition of charge, it somehow chose to bond to the Oxygen. But even that bond didn't make it stable; just the reverse, because even after the bond, it still is left with a positive partial charge. Amazing that a stable atom would seek ever increasing amounts of charge instability, isn't it? Aren't we also taught that all systems tend to move to greater stability? Isn't that why ions take on electrons to begin with? So by what theory of entropy or conservation of energy does the Hydrogen atom seek out a covalent bond, *after which* it is more unstable as a matter of charge than it was before? And how does a Hydrogen atom, which has at most one electron, manage to bond in two different directions? They tell you it has an electron cloud, but it has only one electron. That isn't a cloud. How do you “decentralize” one electron; and even if you did, how would that create two bonds? No answer from the mainstream, just a lot of hot air.

So the second bond of each Hydrogen (and third bond of each Oxygen) is never really explained in ice. The dashed line is just called a Hydrogen bond, and then you get a lot of fluff to back that up. Same with Pollack's second bond out of Hydrogen. He doesn't draw any dashed lines, but many of his bonds are unsupported by any mechanics or sensible theory. He just draws them because he wants them. Of course this also applies to this third line of his Oxygen nucleus. How is that created mechanically? No real answer. It is because it is. It is because Pollack wants it to.

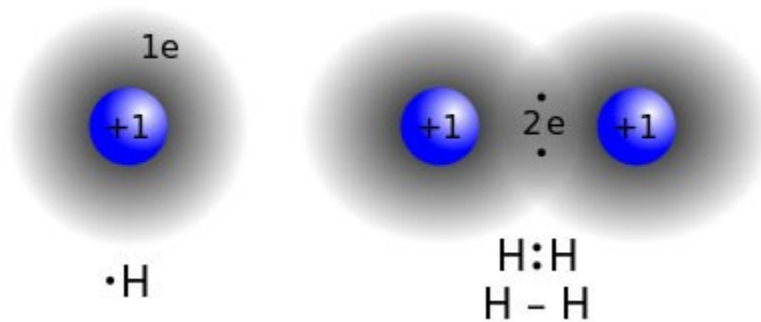
There are problems beyond that, because Pollack wants his EZ water to be negatively charged this way, but he doesn't want his ice to be charged. But since the mainstream diagram of ice has three bonds out of each Oxygen, we should be able to apply his math to it as well. Why isn't ice H_3O_2 , with a net charge of -1?

Like the mainstream, he wants things both ways. Notice that his math contradicts itself. Look at the lower part of his math. He says that each Oxygen has a charge of -2. But wait, this is a covalent bond, not an ionic bond; so each Oxygen *doesn't* have a charge of -2. Only elements in *ionic* bonds can be said to have a charge of -2, since they ionize before they bond. We aren't creating water from ions in a covalent bond. We are creating water from un-ionized Hydrogen and Oxygen. The electrons have to be there or they couldn't be shared. If the electrons are there, there is no reason Oxygen would have a charge of -2. Oxygen is -2 only when it has gained two electrons.

If you don't see what I mean, just notice that if Oxygen could be said to have a charge of -2 here, Hydrogen would have a charge of -1, not +1. If Hydrogen and Oxygen are *sharing* electrons to create a bond, and that sharing adds to Oxygen's electron count, it should *add* to Hydrogen's electron count as well. Hydrogen should also have an extra electron from that sharing, which should give it a net charge of -1.

To say it another way, they never tell you why in a covalent bond, Oxygen shares but *gains* electrons, while Hydrogen shares but *loses*. It would be a pseudo-ionic sort of sharing wouldn't it?

Look, here is the diagram for covalent bond, straight from the mainstream:



See, the Hydrogen is not ionized before bonding. Each one is sharing two electrons. So if we follow the logic of giving Oxygen a charge of -2 in water, we should give each Hydrogen a charge of -1 here.

The truth is, all this assigning of charges by both the mainstream and Pollack is naïve and false. Both the first bonds and the second bonds in hexagonal water aren't created the way you are told, since neither covalent bonds nor Hydrogen bonds exist in the form you are sold. The bonds exist, but they aren't created by electron sharing or by decentralized clouds. They are caused by charge channeling through and between nuclei. See this paper on [the Hydrogen bond](#) for more.

And this means that all of Pollack's diagrams and math on page 56 are pushed. You can't give Oxygen a charge of -2 by electron sharing and then turn around and give Hydrogen a charge of +1 by the same sharing. Pollack, like the mainstream, is just conflating covalent and ionic bonds and trusting you won't catch him at it.

This strongly affects Pollack's argument, because I have shown he cannot logically create negative charge in the EZ this way. His net negative charge is achieved only via pushing math and diagrams.

What we would like to see is a pH test in the EZ, and in chapter 5, Pollack finally provides it, sort of. This by itself is a clue to his push, since it indicates the push may not have been due to accident or ignorance. Why didn't we get a report of pH in the EZ in chapter 4, when he was reporting very low pH outside it? And why, even in chapter 5 when he does report it, does he seem to attempt to cover up the data? Rather than just tell you the EZ is acidic as well, he gives you this confusing diagram [p. 73]:

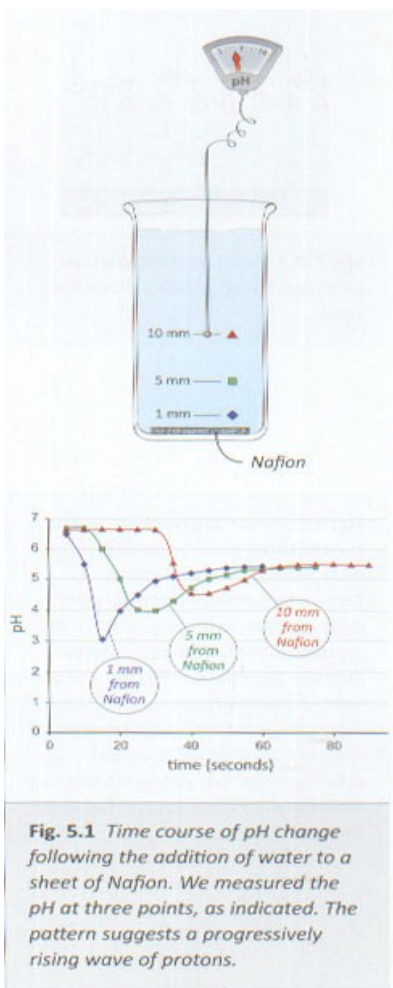
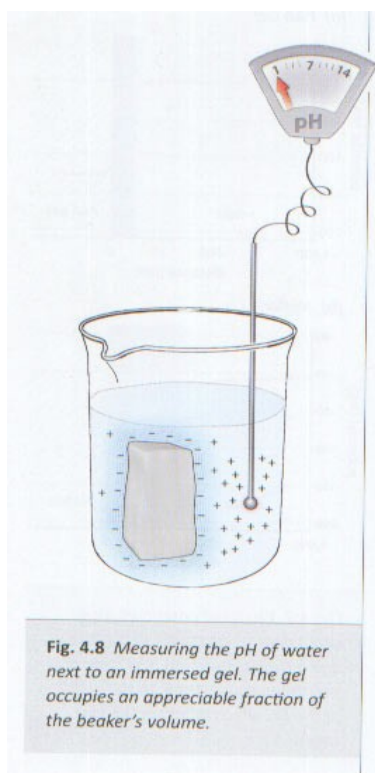


Fig. 5.1 Time course of pH change following the addition of water to a sheet of Nafion. We measured the pH at three points, as indicated. The pattern suggests a progressively rising wave of protons.

That is misdirection, since the red, green and blue indicators aren't telling you low or high pH, they are only telling you how long it took the pH to go low. You have to go to the text and dig a bit to find that the pH went low pretty fast at all distances. Of course this means the EZ isn't charge negative in that sense. Specifically, it contradicts this diagram from chapter 4:



If the pH is also acidic in the EZ, that diagram is false. The EZ may be negative *in some sense*, but not in that sense. Those little minuses drawn are misdirection. The rest of the diagram is a pH diagram, and the pluses indicate low pH. Therefore, the minuses should indicate high pH. But they don't. Pollack has dishonestly imported those minuses from a different test, and they are defined in a different way. So this diagram is conflated like the rest of the theory.

Pollack is pushing furiously in chapter 5, because he is trying to move you away from the idea that the gel or nafion is simply emitting protons. He says so explicitly on p. 73. But his proof against is not at all convincing. He says that the nafion can't emit protons indefinitely, which is true, but none of his tests are long-term. Because he soaks his nafion in a couple of water baths previous to trial, he implies the emission is disproved. But it might take months or years to draw all free-able protons out of a sample, for all we know. It might take centuries. Since he doesn't mention the concentrations or rates, he has not drawn a line through anything here.

But back to chapter 4. Pollack says a report in *PRL* 1997 confirmed H_3O_2 , but that wasn't an experiment on EZ water. It was an experiment on H_2O - D_2O , which is heavy water. His other footnote is to a broken weblink at AIP, so it does us no good. He then tells us that hexamers have been found in water next to graphene, quartz, protein, and so on. Again, not to the point, since 1) the EZ here isn't being created by any of those substances, 2) those substances are hexagonal to start with. Curiously, nafion also has a near-hexagonal central area, which may be skewing the data here. Some EZ water may indeed have limited hexagonal characteristics, but until Pollack shows exactly how those hexagons in the EZ explain the zone, while the hexagons in ice don't, his theory won't have much content. Hexagons should create longer charge paths, not shorter, so it is going to take a lot to convince me the defining characteristic of the EZ is the hexagon. What he needs is to immerse a substance with no hexagonal structure, showing it creates less or no EZ. In this way, I assume the gel was a better candidate than the nafion.

This brings us to Pollack's method of stacking his hexagons. He wants the protons in the bulk water to come from the EZ, not from the gel or nafion, so he needs to have protons kicked out of the 3D hexagonal structure. Basically, he allows all the protons in the third dimension to be jettisoned from the structure, moving out of the EZ and into the bulk water. But this implies the substance in the EZ was originally ice. He is "removing the interplanar protons", and only ice would have those. But since the EZ was never ice to start with, I don't understand what he is doing here. Bulk water doesn't have any interplanar protons, not by any theory, since Pollack is assuming it doesn't have either hexagonal structure or 3D structure. If bulk water already had hexagons, Pollack couldn't explain the differences in the EZ with hexagons, could he? And if bulk water had interplanar protons, it would already have more structure than structured water.

And there is another problem. If these protons move from the EZ to the bulk water, they must have some reason to do so. But if normal water already has interplanar protons, that would mean the bulk water already has them. In that case, why would the protons in the EZ move to the bulk water? You see, Pollack isn't telling us where these protons come from in the first place, or why they would move out of the EZ. Before it became structured, the EZ had to be bulk water. Why would bulk water have all these free protons; and even if bulk water *did* have them, why would the bulk water outside the EZ want more of them? Where are the potentials for *that*? Without charge channeling, you see how Pollack is forced into these contradictions, much like the mainstream. He realizes some things they don't, because his mind is a bit more open; but since he still lacks a mechanical charge field, he cannot help but get lost in these mazes of illogic.

In juggling various methods of stacking planes of hexagons, Pollack borrows sloppy mainstream theory of electrostatic attraction to explain how the EZ could show increased viscosity (see below for more). But he is not able to show how the hexagonal structure creates these long paths out into the liquid. There is no reason hexagons should channel charge so efficiently; if they did, pure ice would be a great conductor of both heat and electricity. It isn't.

We see another contradiction on p. 63, where Pollack admits that the EZ's electrical potential falls off with distance from the surface. We would expect that from my theory, but it contradicts his theory. He says that planar charge must fall with distance, and that this can be explained either by removing negative charge or adding positive charge. However, this strongly conflicts with his hypothesis of protons moving out of the EZ and into the bulk water. That hypothesis implies rising positive charge as we move out, as you can see from the pH diagram above. But the fall in E implies the reverse. To get that, you would have to remove more protons from near the surface and fewer far away. That would make the pH near the surface much higher than the pH far away. That isn't what he found. In the second pH diagram, we see that the lowest pH is found nearest the surface, at 1mm and 20 seconds. And that after a minute, all three pH's go to about 5.5. If nothing else, that indicates that the movement of protons isn't causing the drop in E. So Pollack suggests Oxygens may be removed from the structure more as we move out. But not only does he have no evidence for that, it again starts from the assumption that the Oxygens are ionized, which they aren't. He would have to show some cause of ionization as they break out, and he makes no effort to do that. Beyond that, there is no reason to believe incomplete hexagons would be stable.

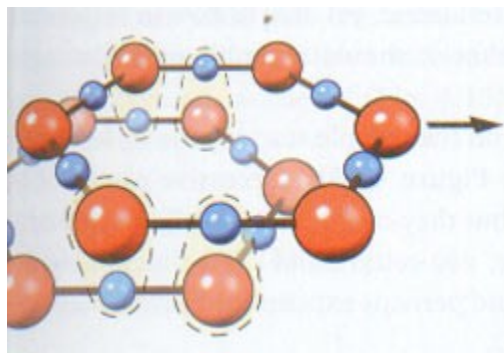
Pollack gives up the farm in yet another way when he admits on p. 63 that protons normally latch onto water molecules to form hydronium ions. There is another big contradiction there, since he now needs to explain why 1) interplanar protons don't latch onto water molecules before they are ejected from the EZ, 2) protons ejected into the bulk water to create the low pH don't latch onto water molecules out there. He needs to admit that of course they do, because that is where the positive charge is coming

from. Ejecting un-ionized hydrogen atoms out into the bulk water couldn't raise the pH, since we have no ionization. And if the Hydrogen *was* ionized as it broke out of the EZ, that ionization would also create free electrons, which would of course negate any pH loss. Pollack would then have to show why ionized Hydrogens were ejected out of the EZ, but free electrons weren't.

Pollack contradicts himself again on p. 65, when he admits that cationic beads create positive EZ's rather than negative. That contradicts several features of his theory, including most obviously his argument that the immersed substance was not providing the ions. Remember, he didn't want the protons coming from the nafion [p. 73]. He wanted them coming from the EZ itself. But if switching the charge profile of the immersed substance also switches the charge profile of the EZ, it is very difficult to argue the substance isn't emitting charge, and thereby ions. I mean, for heaven's sake, that is what anionic and cationic should imply. If they *contain* different charge and different ions, of course they would *emit* different charge and ions. Why would anyone attempt to deny that? You could only deny it by proposing that charge and ions can't pass these boundaries, and all evidence shows they can. The EZ is perfect evidence of that itself.

Then Pollack tells us that positive EZ's are more fragile. He uses this fact to tell us the reason: their lattices contain fewer Oxygens, so the lattices are extremely weak. But again, there is no direct evidence of that. It is just a theory. It is a poor theory, since I hope you can see it can be explained more easily by the emitted particle. If the nafion is emitting protons to create a negative EZ, then a cationic bead must be emitting electrons. Since electrons are much smaller and easier to divert than protons, this explains the fragility without further effort.

Finally, on p. 68, Pollack tells us the EZ excludes because openings in the lattice are small. But this is assuming that incoming particles try to go through the hexagons. What is to stop them from going between planes? Pollack needs to show that the planes must stack very close, and he has not begun to do that. He has proposed it, but the only thing he has done to argue for that is to claim that “if the negatives of one plane lie opposite the positives of the next plane, then those planes could stick by electrostatic attraction.” So let's look closely at that claim. Here is his diagram of it:



So the bond he is proposing is between the Oxygen and Hydrogen of different hexagons in different planes. This means that little old Hydrogen now has *three* bonds! It has only one electron, but Pollack has now manufactured three bonds from that one electron. Amazing. The first bond was a shared bond, remember. The second bond was a “decentralized cloud.” What push of this one electron orbital will Pollack propose to create this third bond?

You see what I mean by non-mechanical. Like his more mainstream colleagues, Pollack just pushes these diagrams wherever he wants to go, without asking himself any hard questions.

In my theory, the EZ excludes because charge is moving out through it. Any charge stream moving left to right will exclude particles trying to move right to left. Mechanical exclusion by real streams of real particles (photons).

So I have shown you 11 pages of pretty awful pushes in just one chapter. It shouldn't give you much confidence in the next chapters.

I take little pleasure in showing you these pushes, since, again, I have no interest in disproving the main lines of Pollack's theory. I am glad to see him insisting the mainstream look seriously at these experiments, and I am glad to see him going against the mainstream in some ways. I am convinced of the reality of structured water, of the EZ, and of the experimental work of Pollack, his colleagues, and his mentors. They are all on the right track, and I applaud them for their determination. However, I repeat that no great progress will be made until the charge field and its mechanics are better understood. Those going against the mainstream have to take on the problems in fundamental theory, questioning not just a handful of minor glitches in atomic theory, but questioning the entire edifice, from the beginning forward. In this paper alone, we have seen problems with all aspects of electron bonding theory, from the covalent bond to the Hydrogen bond to the electrostatic bond; and I hope you have noticed that all those problems arose from trying to explain the field mechanics with the electron instead of with charge itself. Since the time of Bohr, the electron has been sold as the fundamental particle of the E/M and quantum field, but I have shown it is neither. It is little more than a buoy in the charge stream, and the motion of charge photons determines everything here and in almost all quantum, atomic, and molecular problems. Without charge channeling, the mainstream and all its doubters will never be able to do anything but hedge and fudge. Without charge channeling, they will never understand anything, from the nucleus to the Earth to the Sun to the galaxy.

We will look at later chapters of the book in part 3.

*See [my paper on the battery circuit](#), for one example.