

## *Salt does dissolve in water, but not necessarily*

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In this short note I'll challenge Bird's (2001) claim that if, in a world  $w$ , water does not dissolve salt, then Coulomb's law *must* be false in  $w$ . I will show that Coulomb's law can hold in  $w$ , and yet water might fail to dissolve salt. If I am right, then it is clear that Bird's *reductio* fails. So, contingentists can hold on to the view that all laws are contingent.

I will proceed by motivating the view that, in a world  $w$  in which there was an H<sub>2</sub>O compound with a somewhat different structure, it would still be *water*. This point is *consistent* with the Kripke-Putnam view of natural

substances. The latter urges that at least some of the properties of substances (or of natural kinds) are essential to them, but does not assert that all are. Nor does it privilege the structural properties. Kripke (1980: 132), for instance, has famously argued that the property of heat to induce a certain sensation to humans is a contingent property of heat. More importantly, Kripke (1980: 128–29) allows that a certain substance (‘such as the polywater allegedly discovered in the Soviet Union’) can be another ‘form of water’, provided that it is a form of  $H_2O$ , even though ‘it doesn’t have the appearances by which we identified water’. Now,  $H_2O$  in  $w$  would have radically different properties. It would be gaseous; it wouldn’t be an almost universal solvent; life wouldn’t (most probably) exist in  $w$  etc. Yet it would still be the one and only stable substance, whose molecules are composed of one oxygen atom and two hydrogen atoms. Its bonds would still be covalent (so, I take this to be essential to a molecule’s being water). And they could still be polar. For, given the electronegativity of oxygen atoms and the electropositivity of hydrogen atoms, there would be a separation of charge in the ends of the bonds, and the bonds would be polar. Yet, it seems perfectly possible that the charges are so minute that the molecule does not form the triangular shape of water molecules in the actual world. Consequently,  $H_2O$  in  $w$  would not be polar enough to act as a solvent. Perhaps, in  $w$  some other laws would have to be different for water not to be a sufficiently non-polar molecule. But Coulomb’s law needn’t be false.

*Moral:* it seems perfectly possible (metaphysically) that there is a world  $w$  in which water does not dissolve salt. *First Objection:* this substance wouldn’t be *water*. *First answer:* given that it would have the same atomic composition and somewhat similar structure, I don’t see why it wouldn’t be water. *Second answer:* There might be a reason why it shouldn’t be taken to be water, namely, that it does not share all the actual properties of water. This reason, however, is not cogent, unless we think that transworld identity implies sharing of all properties. But it does not (see Plantinga 1977 for more details). *Third answer:* There is another reason why it mightn’t be taken to be water, namely, that it does not share all the *essential* properties of water. This would be a cogent reason, if it were shown that the property in virtue of which water is a solvent is an essential property of it. But this has not been shown. *Second Objection:* By admitting it possible that water might not be a (sufficiently) polar molecule, I have begged the question, by helping myself to a certain possibility: I haven’t proved that it is a *genuine* possibility. *Answer:* What are we entitled to assume when we want to determine the limits of genuine possibility? There is no uncontroversial answer here. The possibility envisaged in the last paragraph is certainly consistent with the laws of nature as well as with the claim that natural substances have a metaphysically necessary composition. It would fail to be a genuine

possibility only if it were shown that the polarity of a water molecule was metaphysically necessary. But this has not been shown.<sup>1</sup>

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### *References*

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