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## Guest Editorial

### Challenging conventional wisdom with vigour

A central question that has long plagued the history of science is: ‘What, if anything, can we ever truly know?’ Some would argue that we can never truly ‘know’ anything at all, although we may choose to ‘believe’ certain things at least until the evidence strongly points us elsewhere. ‘Skepticism’ (from the Greek ‘skepsis’: to inquire) characterises the school of thought which originated with the Greek philosopher Pyrrhon of Elis (c. 360-c.272 BCE) and was later made famous by the Roman philosopher Sextus Empiricus (c. 160-210 CE) (who also incidentally was a leading light of the empiric school of medicine) (Stough, 1969). Empiricus viewed scepticism as a positive mental attitude that preferred the reality of data (ie hard evidence on the true world) rather than the reality of judgement (ie our own belief or the belief of others about the true world). He argued that for anything that was claimed to be true, especially if it is was conventional wisdom rather than based on hard facts, then there was always an equally powerful reason to be sceptical. Perhaps in the veterinary world, a generous dollop of scepticism might not be such a bad thing.

Personally, as a signed-up member of the sceptic movement, a foremost allure of science has always been the power of good quality data to move dialogues from the bloody battlefields of unsupported opinion and myopic belief to the engine room of fact, consensus and improved decision making (Shermer, 2011). The elegance of tight scientific study designs that test and either validate or repudiate current beliefs is an

27 applied art form that never fails to inspire me. Strong data can allow even minnows such  
28 as myself to challenge and supplant eminence-based perspectives of expert opinion with a  
29 new, and hopefully more accurate, world order based on current and good scientific  
30 evidence (Bhandari et al., 2004). But this halcyon view of the power of science then begs  
31 the question: when is the evidence strong enough to accept as fact? When can we ever  
32 emerge from the mire of ‘More research is needed’? How sceptical does a sceptic need to  
33 be?

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35         The current issue of The Veterinary Journal holds a wonderful example by Frank  
36 Nicholas and co-authors of how to tackle this thorny issue of ‘belief versus scepticism’ in  
37 relation to hybrid vigour in dogs ([reference to article in the current journal](#)). As Richard  
38 Dawkins describes in *The Blind Watchmaker*, *explaining* is a difficult art (Dawkins,  
39 2016). The excellence of an explanation can range from ‘good enough that the recipient  
40 understands the words’ to an explanation that is so powerful that the recipient ‘enters a  
41 new world of understanding and effectively feels the new paradigm in the marrow of  
42 their bones’. Frank Nicholas should be congratulated for entering the realms of the  
43 ‘effective explainers’ because I now feel their explanation to the depth of my marrows  
44 and consequently my beliefs about hybrid vigour in dogs have been reshaped  
45 substantially.

46

47         The authors take us on a journey through the history of hybrid vigour, beginning  
48 with the thoughts of Charles Darwin before roaming through the badlands of supporting  
49 evidence from plant and animal production species. We learn that Darwin believed that

50 there was ‘abundant evidence’ for hybrid vigour (Darwin, 1859) and that hybridisation  
51 can double the modern maize production (Troyer, 2006). Although less spectacular, we  
52 also learn that substantial production benefits are also shown in poultry, pigs and cattle.  
53 But a niggling doubt is left hanging throughout: surely the dog is not a production species  
54 and therefore perhaps these data are not relevant to the dog?

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56           Genetics can be a complicated endeavour but there is no escaping the need to  
57 explore some genetics if we are to fully grasp the hybrid vigour nettle. Thankfully, the  
58 authors walk us unscathed through the four principles behind hybrid vigour, some of  
59 which blew my mind with their counter-inductivity. For example, ‘Principle 1: the lower  
60 the heritability of a trait, the greater is the expected hybrid vigour’ (surely that can’t be  
61 true!!) and ‘Principle 3: ‘breeding from hybrids dissipates hybrid vigour’ (a paradox  
62 where hybrid vigour can only exist if we maintain highly inbred parent populations).  
63 Evidence from plant and production animal science helps us to understand that ‘Principle  
64 2: the greater the genetic diversity between the parental populations, the greater is the  
65 expected hybrid vigour’ and ‘Principle 4: the more inbred the parents, the greater the  
66 hybrid vigour’. Potential applications from these principles to improved dog breeding are  
67 mooted throughout this section and the reader is teased with the prospect of a utopian  
68 future of disease-free dogs.

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70           However, all is not necessarily as it seems. Using Agatha Christie-esque writing  
71 techniques, the authors set the scene, introduce us to the characters and build us up to see  
72 this wonderful new future for dogs before casually smashing our dreams using logic and

73 evidence as weapons of choice to highlight that belief in hybrid vigour in dogs may be  
74 based on very shaky foundations. For example, levels of inbreeding in dogs are nowhere  
75 near the 100% inbreeding of maize and therefore any hybrid vigour gains from Principle  
76 4 are limited (Leroy et al., 2015). Study design limitations in the published literature  
77 which apparently provided some evidence for hybrid vigour in dogs are laid bare and the  
78 potentials for bias and misclassification are highlighted. The reliability of the breed data  
79 used in many studies is recurring concern and the authors argue that in-depth knowledge  
80 of the parental breeds across the generations is an absolute requirement for any study that  
81 claims to explain hybrid vigour. Erstwhile believers in hybrid vigour as salvation for dog  
82 health are led to the despair of questioning whether hybrid vigour effects exist in dogs at  
83 all. But like all good blockbusters, the authors provide hope at the end by listing several  
84 options to harness and validate any hybrid vigour effects that may truly exist in dogs and  
85 suggesting how these might be woven into post-modern breeding practices in a positive  
86 fashion.

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88         So, where does this all leave us in relation to our opening thoughts about the  
89 usage of good scientific evidence to validate or repudiate beliefs, especially in relation to  
90 hybrid vigour? For me, I think the answer is that I have shifted towards being a weaker  
91 believer. There is much evidence suggesting that some hybrid vigour effects exist in dogs  
92 but none of this is conclusive or even that strong. Rather than ‘more’ research is needed,  
93 it seems that ‘better’ research is needed, with a special need for good parentage and  
94 phenotypic data. In this modern era of evidence based veterinary medicine, we should  
95 retain our healthy scepticism until we have seen enough evidence and I leave the final

96 word to the philosopher George Santayana; ‘Scepticism is the chastity of the intellect,  
97 and it is shameful to surrender it too early or to the first comer.’

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110 [References](#)

111

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113 Bhandari, M., Zlowodzki, M., Cole, P.A., 2004. From eminence-based practice to  
114 evidence-based practice: a paradigm shift. *Minn Med* 87, 51-54.

115 Darwin, C., 1859. *On the Origin of Species by means of Natural Selection, or the*  
116 *preservation of favoured races in the struggle for life.* John Murray, London.

117 Dawkins, R., 2016. *The Blind Watchmaker: 30th anniversary edition.* Penguin  
118 Random House, UK.

119 Leroy, G., Phocas, F., Hedan, B., Verrier, E., Rognon, X., 2015. Inbreeding impact on  
120 litter size and survival in selected canine breeds. *The Veterinary Journal* 203, 74-78.

121 Shermer, M., 2011. The believing brain. *Scientific American* 305, 85-85.

122 Stough, C.L., 1969. *Greek skepticism : a study in epistemology.* University of  
123 California Press, Berkeley (Calif.) ; London.

124 Troyer, A.F., 2006. Adaptedness and heterosis in corn and mule hybrids. *Crop*  
125 *Science* 46, 528-543.