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The Crisis of Integrity-Deficient Science

Paul Driessen

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The epidemic of agenda-driven science by press release and falsification has reached crisis proportions.

In just the past week: Duke University admitted that its researchers had falsified or fabricated data that were used to get $113 million in EPA grants – and advance the agency's air pollution and "environmental justice" programs. A *New England Journal of Medicine* article and editorial claimed the same pollutants kill people – but blatantly ignored multiple studies demonstrating that there is no significant, evidence-based relationship between fine particulates and human illness or mortality.

In an even more outrageous case, the American Academy for the Advancement of Science's journal *Science* published an article whose authors violated multiple guidelines for scientific integrity. The article claimed two years of field studies in three countries show exposure to neonicotinoid pesticides reduces the ability of honeybees and wild bees to survive winters and establish new populations and hives the following year. Not only did the authors' own data contradict that assertion – they kept extensive data out of their analysis and incorporated only what supported their (pre-determined?) conclusions.

Some 90% of these innovative neonic pesticides are applied as seed coatings, so that crops absorb the chemicals into their tissue and farmers can target only pests that feed on the crops. Neonics largely eliminate the need to spray with old-line chemicals like pyrethroids that clearly do harm bees. But neonics have nevertheless been at the center of debate over their possible effects on bees, as well as ideological opposition in some quarters to agricultural use of neonics – or any manmade pesticides.

Laboratory studies had mixed results and were criticized for overdosing bees with far more neonics than they would ever encounter in the real world, predictably affecting their behavior and often killing them. Multiple field studies – in actual farmers' fields – have consistently shown *no adverse effects* on honeybees at the colony level from realistic exposures to neonics. In fact, bees thrive in and around neonic-treated corn and canola crops in the United States, Canada, Europe, Australia and elsewhere.

So how did the Dr. Ben Woodcock, *et al.* Center for Ecology and Hydrology (CEH) field studies reach such radically different conclusions? After all, the researchers set up 33 sites in fields in Germany, Hungary and England, each one with groups of honeybee or wild bee colonies in or next to oilseed rape (canola) crops. Each group involved one test field treated with fungicides, a neonic and a pyrethroid; one field treated with a different neonic and fungicides; and one "control" group by a field treated only with fungicides. They then conducted multiple data analyses throughout the two-year trial period.

Their report and *Science* article supposedly presented all the results of their exhaustive research. They did not. The authors fudged the data, and the "peer reviewers" and AAAS journal editors failed to spot the massive flaws. Other reviewers (here, here and here) quickly found the gross errors, lack of transparency and misrepresentations – but not before the article and press releases had gone out far and wide.

Thankfully, and ironically, the Woodcock-CEH study was funded by Syngenta and Bayer, two companies that make neonics. That meant the companies received the *complete* study and *all 1,000 pages* of data – not just the portions carefully selected by the article authors. Otherwise, all that inconvenient research information would probably still be hidden from view – and the truth would never have come out.

Most glaring, as dramatically presented in a chart that's included in each of the reviews just cited, there were far more data sets than suggested by the *Science* article. In fact, there were *258* separate honeybee statistical data analyses. Of the 258, a solid *238 found no effects* on bees from neonics! Seven found *beneficial* effects from neonics! Just nine found harmful impacts, and four had insufficient data.

Not one group of test colonies in Germany displayed harmful effects, but five *benefitted* from neonics. Five in Hungary showed harm, but the *nosema* gut fungus was prevalent in Hungarian beehives during the study period; it could have affected bee foraging behavior and caused colony losses. But Woodcock and CEH failed to mention the problem or reflect it in their analyses. Instead, they blamed neonics.

In England, four test colony groups were negatively affected by neonics, while two benefitted, and the rest showed no effects. But numerous English hives were infested with Varroa mites, which suck on bee blood and carry numerous pathogens that they transmit to bees and colonies. Along with poor beekeeping and mite control practices, Varroa could have been the reason a number of UK test colonies died out during the study – but CEH blamed neonics.

(Incredibly, even though CEH's *control* hives in England were far from any possible neonic exposure, they had horrendous overwinter bee losses: 58%, compared to the UK national average of 14.5% that year, while overwinter colony losses for CEH hives were 67-79% near their neonic-treated fields.)

In sum, fully 95% of all the hives studied by CEH demonstrated no effects or benefitted from neonic exposure – but the *Science* magazine authors chose to ignore them, and focus on nine hives (3% of the total) which displayed harmful impacts that they attributed to neonicotinoids.

Almost as amazing, CEH analyses found that nearly 95% of the time pollen and nectar in hives showed *no measurable neonic residues*. Even samples taken directly from neonic-treated crops did not have residues – demonstrating that bees in the CEH trials were likely never even exposed to neonics.

How then could CEH researchers and authors come to the conclusions they did? How could they ignore the 245 out of 258 honeybee statistical data analyses that demonstrated no effects or beneficial effects from neonics? How could they focus on the nine analyses (3.4%) that showed negative effects – a number that could just as easily have been due to random consequences or their margin of error?

The sheer number of "no effect" results (92%) is consistent with what a dozen other field studies have found: that foraging on neonicotinoid-treated crops has no effect on honeybees. Why was this ignored?

Also relevant is the fact that CEH honeybee colonies near neonic-treated fields recovered from any adverse effects of their exposure to neonics before going into their winter clusters. As "super organisms," honeybee colonies are able to metabolize many pesticides and detoxify themselves. This raises doubts about whether any different overwintering results between test colonies and controls can properly be ascribed to neonics. Woodcock, *et al.* should have discussed this, but failed to do so.

Finally, as The Mad Virologist pointed out, if neonics have negative impacts on bees, the effects should have been consistent across multiple locations and seed treatments. They were not. In fact, the number of bee larval cells during crop flowering periods for one neonic increased in response to seed treatments in Germany, but declined in Hungary and had no change in England. For another neonic, the response was neutral (no change) in all three countries. Something other than neonics clearly seems to be involved.

The honest, accurate conclusion would have been that exposure to neonics probably had little or no effect on the honeybees or wild bees that CEH studied. The *Washington Post* got that right; *Science* did not.

US law defines "falsification" as (among other things) "changing or omitting data or results, such that the research is not accurately represented in the research record." Woodcock and CEH certainly did that here; the AAAS and *Science* failed to do basic fact-checking before publishing the article; the media parroted the press releases; and anti-pesticide factions rushed to say "the science is settled" against neonics.

The AAAS and *Science* need to retract the Woodcock article, apologize for misleading readers, and publish an article that fully, fairly and accurately represents what the CEH research and other field studies have actually documented. They should ban Woodcock and his coauthors from publishing future articles in *Science*. They should also issue press releases explaining all these actions.

Failure to do so would mean falsification and fraud have replaced integrity at the highest levels of once-respected American institutions of scientific investigation and advancement.