Department of Health and Human Services

DEPARTMENTAL APPEALS BOARD

Civil Remedies Division

Office of Research Integrity,
U.S. Department of Health and Human Services,

Petitioner,

v.

Dr. H.M. Krishna Murthy,
Respondent.

Docket No. C-17-412

Decision No. CR5007

Date: January 19, 2018

AMENDED RECOMMENDED DECISION

I grant summary judgment in favor of the Office of Research Integrity (ORI) and sustain its determination to impose a ten-year debarment and a ten-year ban on Public Health Service advisory services against Respondent, Dr. H.M. Krishna Murthy. I also sustain as an additional administrative action the correction of Respondent's research record.

I. Background

ORI moved for summary judgment against Respondent and Respondent opposed the motion. With its motion and supporting brief (ORI Br.), ORI filed exhibits that are identified as ORI Ex. 1-ORI Ex. 73. Respondent filed a brief in opposition (Resp. Opp. Br.) and 63 proposed exhibits. I have identified these exhibits as R. Ex. 1-R. Ex. 63. I find it to be unnecessary that I receive into evidence the parties' exhibits inasmuch as I decide this case solely on undisputed material facts. I cite to the parties' exhibits only as illustrations of facts that are not in dispute.

II. Issues, Findings of Fact and Conclusions of Law

A. Issues

The issues are whether undisputed material facts establish that Respondent engaged in research misconduct as that term is defined by applicable regulations, and whether ORI's remedy determinations are reasonable.

B. Findings of Fact and Conclusions of Law

I issue summary judgment pursuant to 42 C.F.R. § 93.506(b)(15), which allows for summary judgment in cases involving ORI where there are no disputed issues of material fact. I base my decision solely on undisputed material facts. A material fact is any fact the existence of which would potentially affect the outcome of a case. I have considered whether a dispute as to any material fact exists by deciding whether any reasonable inference may be drawn from that fact that would be favorable to Respondent. *Scott J. Brodie,* DAB CR2056, at 5 (2010), *aff'd, Brodie v. U.S. Dep't. of Health & Human Servs.*,796 F. Supp. 2d 145 (D.D.C. 2011). In granting summary judgment I distinguish material facts that are supported by evidence that would be admissible at a hearing from unsupported fact allegations. Unsupported allegations do not establish disputed issues of fact, nor do allegations that are fanciful or that are supported by such minimal evidence as to be beyond any reasonable probability of existence. *Id.*

ORI supports its motion in part on technical facts about biochemistry and laboratory processes and procedures. But, ORI's allegations based on these facts are not at all difficult to comprehend. ORI alleges that in a period that began in 1998 and that continued through 2007, Respondent, then employed as an associate professor at the University of Alabama at Birmingham (UAB), intentionally, recklessly, or knowingly falsified and/or fabricated 11 protein structures and reported them in nine publications and in 12 entries to an entity known as the Protein Data Bank (PDB).

I find ORI's allegations to be supported overwhelmingly by the undisputed material facts. Respondent admits that the 11 protein structures in question contained material errors (errors that invalidated Respondent's research findings) and that he published these incorrect findings as is alleged by ORI. His defenses are that he made honest mistakes that do not amount to fraud or reckless indifference to the truth, that his errors are commonplace in the research community – that everybody makes and publishes errors like the ones that he made and published – and that, furthermore, he is the victim of a vendetta conducted against him by individuals at UAB and by ORI.

As I discuss below, the conclusion that I draw from the undisputed facts is that the errors contained in the 11 protein structures were not honest mistakes but rather, were the product of either fraud or reckless indifference by Respondent to the truth or falseness of his publications. That is the only reasonable conclusion that one could draw. There is a pattern to Respondent's publications that leads inescapably to a finding of research

misconduct. That pattern is evident from both the number of Respondent's false submissions and their character. Respondent published the same types of false and/or fabricated findings over and over under circumstances where such errors cannot be explained by honest mistakes.

I have carefully evaluated the facts offered by ORI that support its allegations in the context of Respondent's assertions. I find that nothing that Respondent asserts rebuts the undisputed facts of this case. Many of Respondent's fact contentions are fanciful and are not evidence-based. I find no support in the record for Respondent's contention that his false research findings are typical of errors that are commonplace. I find Respondent's assertion that he is the victim of a vendetta to be both fanciful and irrelevant as a matter of law.

Finally, I have evaluated ORI's proposed remedies in light of the undisputed material facts and my conclusion is that Respondent committed research misconduct. Those remedies are strongly supported by the egregiousness of Respondent's misconduct.

What is research misconduct? It is defined by 42 C.F.R. § 93.103 to be "fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results." The regulation defines "fabrication" as "making up data or results and recording or reporting them." *Id.* § 93.103(a). It defines "falsification" as "manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record." *Id.* § 93.103(b).

In order to find by a preponderance of the evidence that Respondent committed research misconduct I must find that Respondent's research and/or publications significantly departed from accepted practices in his research community and that Respondent intentionally, knowingly, or recklessly fabricated or falsified his research or his publications. 42 C.F.R. § 93.104.

A party accused of research misconduct may defend himself or herself by arguing that he or she conducted his or her research in accord with accepted practices and/or that his or her findings and publications are accurate. Additionally, a party may contend that his or her errors are honest mistakes and not fraud or made in reckless indifference to the truth. 42 C.F.R. § 93.103(d).

This case is about proteins and scientists' descriptions of proteins' structures via a technique known as X-ray crystallography.

Proteins are biological molecules composed of amino acids that are linked together in a chain. A protein has a three-dimensional structure. ORI Ex. 1 at ¶¶ 14-15. A protein's structure indicates how a protein functions. Understanding a protein's structure may

enable scientists to formulate drugs that can treat diseases that are caused by certain proteins. *Id.*

X-ray crystallography is a process that assists scientists in describing a protein's structure. It consists of directing X-ray beams at a protein crystal. That will produce a diffraction pattern that is unique to each protein. Scientists use a diffraction pattern to map the distribution of electrons within a protein. ORI Ex. 1 at ¶¶ 16-20. From such a map scientists can deduce a protein's molecular structure and can construct a three-dimensional model of the protein. Such a model is rendered as a computer-generated graphic that may be examined by scientists just like a three-dimensional physical model could be examined. ORI Ex. 1 at ¶ 20, 21, and 26.

There is a process known as validation – validation tools existed at the time that Respondent published his research – by which a researcher may verify the accuracy of his or her protein model. One of the purposes of validation is to identify atoms that are incorrectly placed in a protein model. Researchers validate their models by comparing the location of atoms in the model with the electron density map of that protein derived by X-ray crystallography. If electron density in a particular location precludes the presence of an atom at that location, then one may conclude that the atom cannot possibly be present at that location. And, if the model shows the presence of an atom at an impossible location, then the model is incorrect. ORI Ex. 1 at ¶¶ 22-23, 38; ORI Ex. 2 at ¶ 9.

Researchers deposit their models of proteins' structures into the PDB after they have validated them. ORI Ex. 2 at ¶ 2. The PDB is an open depository, accepting models from anyone who offers them. That effectively creates an honor system in which the PDB's value to researchers depends on the honesty, integrity, and the accuracy of those who deposit protein models there. ORI Ex. 2 at ¶¶ 5-6. Deposits consist of coordinate files containing the atomic coordinates of a protein's model and structure factor files containing the raw experimental data derived from X-ray diffraction. *Id.* at ¶ 8; ORI Ex. 1 at ¶¶ 19, 24, 25, and 28.

Many of the protein structures that Respondent published and/or deposited in the PDB contained gross errors; errors that I find could not possibly have been the consequence of honest error. These errors became apparent upon review by several individuals and entities.

First, there are interatomic clashes in several models that Respondent deposited and/or published. In layman's terms, Respondent's models had atoms located in positions that were not physically possible. In numerous instances Respondent submitted protein models that described more than one atom located in the same location. ORI Ex. 1 at ¶¶ 22-23, 30, 36-39, 40-49, 88-91, 95-98, 102-105, 109-112. Such "clashes" (more than one atom allegedly located in the same position) will be detected through validation and

should have been obvious to Respondent prior to his depositing and/or publishing his models. *Id.* at ¶¶ 22-23, 38-39. Eight of the 11 models at issue in this case contain such clashes. Respondent deposited five of them in the PDB without correcting their obvious errors before depositing them. The proteins for which Respondent deposited models with clashes are identified as PDB entries: 2HRO, 1BEF, 1RID, 1Y8E, and 2A01. *Id.* at ¶¶ 40-49, 88-91, 95-98, 102-105, 109-112.

Second, on six separate occasions, Respondent deposited structure factor files in the PDB that were missing an important component, the diffraction measurements from the contribution of bulk solvent ("structure factor files" are data containing the measurements obtained from X-ray diffraction experiments). The six proteins in question are PDB entries 2HR0, 1BEF, 1RID, 1Y8E, 2A01, and 1CMW. ORI Ex. 1 at ¶¶ 70, 92, 99, 106, 113, 116.

The absence of bulk solvent contributions in the structure factor files is important because solvent, often water, is necessary for proteins to maintain their three-dimensional structure. Structure factor files, in order to be meaningful, must contain bulk solvent contributions because correctly performed X-ray diffraction experiments always will have measurements relating to the bulk solvent contribution. ORI Ex. 1 at ¶¶ 68-69.

Third, three of the protein models that Respondent deposited in the PDB, contained crystal lattice gaps that are physically impossible. These PDB entries are 2HR0, 1G40, and 1L6K. ORI Ex. 1 at ¶¶ 62, 122, 126, 137-38.

In order to form a protein crystal, protein molecules must form a lattice that is created by interactions between adjacent molecules. Crystals cannot form without such stabilizing interactions. ORI Ex. 1 at ¶¶ 10, 60-61. But, models deposited by Respondent contained large gaps that would be impossible in a protein crystal because the distances between the molecules in Respondent's models rendered stabilizing interactions impossible. *Id.* at ¶¶ 62, 122, 126, 137-38.

The undisputed facts establish that Respondent could not have derived the physically impossible features of Respondent's models and alleged supporting data – the numerous atomic clashes, the absence of bulk solvent contributions, and the large crystal lattice gaps – from legitimately performed X-ray diffraction experiments. I conclude that no honest scientific researcher could have produced these errors had he or she conducted legitimate experiments.

The atomic clashes that Respondent's models contained would have been evident to any competent researcher through the use of validation tools. That is because it is physically impossible for more than one atom to occupy the same space. The X-ray diffraction data that Respondent produced for those of his models with clashes unambiguously matched up with the clashes. ORI Ex. 1 at ¶¶ 40-49, 90, 97, 104, 111. Thus, the models that

Respondent submitted containing clashes could not possibly have been derived from actual X-ray diffraction experiments as Respondent asserted. The only possible explanations for these models containing gross clashes are either that Respondent intentionally fabricated these models (as well as the underlying data) or was indifferent to whether X-ray diffraction sustained his models.

I find also that no honest researcher would deposit structure factor files into the PDB without including values relating to bulk solvent contributions. The only possible explanations for Respondent's failure to do so were that he fabricated his models without regard for underlying diffraction data and/or that he didn't care what that data contained. As I have explained, legitimately derived X-ray diffraction maps always contain bulk solvent contributions because bulk solvent must be present in order for crystals to form and also to diffract X-rays in an X-ray diffraction experiment. It should be evident to any competent researcher that deposited experimental data that are missing bulk solvent contributions are invalid. ORI Ex. 1 at ¶¶ 68-71, 92, 99, 106, 113, 116. Yet, Respondent admittedly deposited such invalid data on multiple occasions.

It is also out of the question that an honest researcher would deposit protein models in the PDB that contain lattice gaps that render physically impossible those proteins' crystalline structures. Real experimental data would not correspond to the models that Petitioner deposited. The only inferences that I can draw from these patently incorrect models are either that Petitioner intentionally fabricated them or that he created them indifferent to what his experimental data actually showed. ORI Ex. 1 at ¶¶ 60-62, 122, 126, 137-38.

Not only did Respondent's models contain gross errors, as I have described, but Respondent repeatedly published or deposited data containing the same type of errors. There is a pattern to Respondent's conduct. On multiple occasions he deposited protein models in the PDB that contained obvious clashes. On multiple occasions he submitted underlying data that were missing obvious and integral components. On multiple occasions Respondent submitted models with lattice structures that could not possibly have existed in the real world.

Everyone makes mistakes from time to time and perfection is not a standard for judging any researcher's work pursuant to the regulations governing misconduct in science. A scientist might deposit a protein model in the PDB that contains innocent or trivial errors without intending to defraud and without indifference to the truth of his or her submission. But, no honest researcher would deposit or publish so many false models or so much false data as Respondent published or deposited. The sheer number of false submissions by Respondent over the course of nearly a decade is as damning as is the character of what he deposited and published.

What is evident, then, is that Respondent published or deposited protein models in the PDB that contained numerous gross errors that no honest or minimally competent

researcher would have tolerated and did so repeatedly. The only inference that I can draw from the undisputed facts regarding these publications and deposits is that Respondent intentionally fabricated them or didn't care whether what he published or deposited was accurate.

This inescapable inference is corroborated by additional undisputed facts, facts that demonstrate that Respondent attempted to obfuscate his false deposits and publications when he was confronted with them. That was made evident by Respondent's attempts to deflect scrutiny of his false submission of PDB entries identified as 1G40 and 1L6K.

When confronted with the impossible lattice gaps in these protein structures, Respondent asserted at first that he had made honest errors by inadvertently depositing the parameters of another structure for 1G40 and by also inadvertently submitting the wrong data to substantiate 1L6K. ORI Ex. 53 at 3-4. Respondent submitted new information, replacing the parameters in his PDB entry for 1G40, and replacing his entry of 1L6K with an entry for a different protein, 2OU1. These new submissions by Respondent eliminated the gross lattice gaps in the models that Respondent had originally deposited. ORI Ex. 13; ORI Ex. 17 at 2; ORI Ex. 1 at ¶¶ 126, 138.

However, these new submissions by Respondent also contained gross misstatements that plainly were false. The data that Respondent submitted to eliminate the lattice gap in 1G40 contained several physically impossible clashes. ORI Ex. 1 at ¶¶ 124, 126. Thus, Respondent replaced patently false or fabricated scientific data with other data that was also patently false or fabricated.

Respondent's replacement of 1L6K with 2OU1 also is an evident fabrication. Respondent's "new" protein model is almost identical to the original (1L6K) except that he shifted some of the atomic coordinates in the model, thus eliminating the lattice gaps that existed in that protein. But, Respondent provided no comprehensible explanation for how he derived this allegedly new data. ORI Ex. 1 at ¶ 139.

Respondent's indifference to the truth of his submissions is evident also from his failure to respond to concerns expressed by the PDB about the accuracy of his models. On more than one occasion, the PDB flagged issues with Respondent's deposits – issues such as atomic clashes – and invited Respondent to file corrections. However, Respondent ignored the concerns expressed by the PDB and went ahead and deposited his models without corrections. ORI Exs. 12, 14-16, 18, 19.

The investigation into Respondent's submissions conducted first by UAB and then, by ORI, lasted several years, during which Respondent produced a blizzard of assertions and arguments in his defense. I have considered these along with the arguments that

Respondent makes in opposition to ORI's motion for summary judgment. None of them is supported by objective fact. In the end, Respondent offers no reasonable excuse for his misconduct.

Respondent's arguments fall into broad categories. *See* Resp. Opp. Br. First, although Respondent concedes that his PDB deposits and publications contained errors, he contends that these were honest mistakes and not the product of fraud or reckless indifference to the truth. Second, Respondent argues that, inasmuch as ORI is charging him with fraud, it has a duty to establish the methodology by which he allegedly committed that fraud. Third, Respondent asserts that everybody does what he did – that although his deposits and publications contained errors, they were no different in that respect from deposits and publications made by other researchers. Finally, Respondent argues that he is the victim of a years-long vendetta conducted by UAB and then by ORI. He depicts himself as an innocent victim, the target of sinister forces within the research community.

I see nothing that supports Respondent's contention that his errors were honest mistakes. He has offered no evidence to explain, for example, how so many of his PDB deposits contained clashes that rendered his models to be physically impossible. Nor has he explained in legitimate scientific terms the absence of bulk solvent contribution or lattice gaps in his models. I have looked closely at the justifications he gave for these errors at the time he was confronted with them. His justifications neither make sense nor are they supported by facts. His contention reduces to an assertion that is without support.

Respondent did not offer his testimony to support his contention that he made only honest errors. I afforded him the opportunity to testify. In my initial pre-hearing order I directed him to offer his testimony as either a sworn affidavit or a declaration made under penalty of perjury. Respondent did not avail himself of that opportunity. That is his right, of course. His testimony is not compulsory. But, having declined to testify, Respondent cannot now make unsworn assertions of his honesty and lack of culpability and expect me to accept them as facts in dispute.

When Respondent was confronted with the absence of bulk solvent contribution in the structure factor files for six of his PDB deposits, he contended that on six separate occasions he had accidentally deposited the wrong values, thereby accidentally removing the bulk solvent contributions. ORI Ex. 53 at 2. I find that explanation to be inconceivable. The structure factor files – containing the X-ray diffraction data – that Respondent deposited were critical to validating Respondent's models. X-ray diffraction data from experiments on real proteins will always include, among its measurements, a bulk solvent contribution. *See e.g.*, ORI Ex. 1 at ¶ 70. If, in fact, Respondent had conducted actual experiments, his experimental data would have included bulk solvent contribution. The only possible explanation for the absence of bulk solvent contribution in the X-ray diffraction data was that Respondent did not conduct any actual experiments,

but rather, intentionally fabricated his protein structures. ORI Ex. 1 at ¶ 70, 92, 99, 106, 113.

When Respondent was confronted with proof of impossible lattice crystal gaps in his models, he asserted, variously, that his deposits contained typographical errors or that he had inadvertently submitted the wrong data. ORI Ex. 53 at 3-4; ORI Ex. 13 at 1; ORI Ex. 17 at 2. However, he changed his story when confronted with the fact that his explanations didn't justify the gaps, to assert with respect to a protein identified as 2HR0 that disordered protein fragments effectively filled the gap in his model, thereby supporting the structure. ORI Ex. 52; ORI Ex. 54 at 2. Respondent's shifting explanations do not support his contention that he made honest mistakes. Rather, they suggest only that he cast about for explanations that would excuse his fraud.

Respondent argues that two anonymous referees determined that the models that he deposited in the PDB are not fabricated. *See* R. Ex. 21. However, close examination of these referees' comments provides Respondent with no support. The referees looked only at *one* of the eleven structures that are at issue here. The referees' analysis would provide Respondent with no basis for asserting that his errors were all innocent even if they concluded that Respondent did not fabricate this structure, identified as 2HR0. Moreover, they did not conclude that Respondent's submission was honest but only that finding fraud as opposed to incompetence at the then-early stage of the review of Respondent's work was premature. *See Id.* at 6.

Respondent also contends that his laboratory notebooks support his experimental findings. He also relies on statements by colleagues that he was performing research while employed by the University of Alabama at Birmingham. *See* R. Exs. 38, 39. However, Respondent has pointed to nothing in his notebooks or in colleagues' statements that explain the gross errors in the materials that he deposited in the PDB or that explain how he could honestly have come up with so many scientifically impossible findings.

Respondent argues that ORI hasn't shown that it actually searched his notebooks and attempted to correlate the notebooks' experimental findings with Respondent's deposits at the PDB. Resp. Opp. Br. at 18. But, that isn't ORI's responsibility. It is Respondent – not ORI – who claims that the notebooks vindicate him. Respondent has the burden of showing how the notebooks support him and he has failed to accomplish that.

There is no basis in law for Respondent's argument that ORI's claims of fraud or reckless indifference are unsupported absent proof of Respondent's methodology in committing misconduct. In this case the facts speak for themselves: as I find, the pattern and character of Respondent's false deposits and publications inescapably leads to the conclusion that he either deliberately falsified research results or made deposits

indifferent to the truth of his submissions. It is unnecessary that ORI prove *how* Respondent falsified his research. It suffices that ORI proved that Respondent did it.

Respondent contends that "'physically impossible features' occur in all [protein] structures, and . . . are a consequence of unavoidable errors in the measured data used to determine structures . . . ." Resp. Opp. Br. at 1. With this argument Respondent appears to contend that his deposits in the PDB, albeit flawed, were of a character with all deposits at the PDB.

That argument finds no support in Respondent's submission. There is nothing in his proposed exhibits that justifies so sweeping an assertion. It is true that deposits in the PDB may contain errors such as atomic clashes. And, as I have stated, honest science is not error free. Even the most diligent researcher may make mistakes from time to time. However, *nothing* offered by Respondent – and certainly, not the facts relied on by ORI – leads to an inference that the pattern of errors in Respondent's deposits and the frequency of those errors is remotely typical of the research results submitted by others. *See* R. Ex. 1; R. Ex. 21.

Respondent's "everybody does it" argument rests on fanciful assertions not supported by facts. For example, Respondent makes "the reasonable assumption that an average structure sports . . . 46 'physically impossible features' . . . ." Resp. Opp. Br. at 5. As support for this contention he cites R. Ex. 1. But, Respondent offers no explanation how this exhibit leads to that conclusion. Nor does he explain what he means by "physically impossible features."

Respondent argues that ORI's allegations have no validity in the absence of proof that his deposits in the PDB are distinguishable from other researchers' deposits. Indeed, according to Respondent, ORI's allegations cannot be validated unless ORI compares Respondent's deposits with the 132,000 structures (Respondent's estimate) on deposit at the PDB. He reasons that there is no way of knowing whether his deposits are atypical, much less fraudulent, absent such a comparison.

I find this argument to be without merit. ORI rests its case on the gross and evident errors in Respondent's deposits. The patent falseness of the models submitted by Respondent is enough for me to conclude that these deposits are fabricated or made with reckless indifference to the underlying data. It is not necessary that ORI prove that other researchers' deposits are free from fraud or that they do not contain the gross errors evident in Respondent's deposits.

Respondent argues that even the individuals who reviewed his work product have committed errors. *See* R. Ex. 1. Accepting that assertion as true, it doesn't provide Respondent with a defense. At best, Respondent might show that others have made

mistakes here or there. That is a far cry from the pattern of misconduct that the facts of this case establish.

Respondent also contends that one of ORI's experts who scrutinized Respondent's work product supports Respondent's contention that his errors were, at worst, innocent. He relies heavily on the expert's comment that poor quality data does not necessarily imply the presence of fraud. *See* R. Ex. 60 at 1-2; R. Ex. 26. But, that statement does not undercut the expert's conclusion that Respondent committed inexplicable errors. ORI's expert noted that the clashes in Respondent's structures corresponded with the experimental data. The expert stated that what this showed was that Respondent's structures could not have come from actual experiments since data from actual experiments would not match up or correspond with physically impossible features in a model. ORI Ex. 1 at ¶¶ 40-49, 88-91, 95-98, 102-05, 109-12.

Much of Respondent's argument consists of his claim that is that he is the victim of a vendetta. He calls ORI's experts liars. He asserts that ORI's researchers are biased, prejudiced, and xenophobic. He characterizes these researchers as "lynch mobs." Resp. Opp. Br. at 21. These allegations are irrelevant. It is irrelevant at this juncture how ORI adduced the facts on which it relies. If those facts establish that Respondent committed research misconduct – as they do in this case – then it does not matter that the individuals who produced those facts may have displayed animus toward Respondent.

Moreover, Respondent has produced nothing to establish that he is the victim of a vendetta. His assertions that he has been victimized appear to flow entirely from the fact that reviewers concluded that he committed research misconduct. Respondent seems to reason that any conclusion adverse to him inevitably was the product of animus and bias. But, that conclusion does not follow from Respondent's allegations. I repeat: Respondent has offered no facts from which I could infer that he has been victimized.

Finally, Respondent contends that he has been denied the opportunity to conduct discovery, asserting that ORI did not provide copies of electronic data that he had requested that ORI produce. I find this argument to be without merit for two reasons. First, I offered Respondent the opportunity to object to ORI's discovery production. Respondent did not do so timely and made his complaint months after the period for conducting discovery elapsed. Second, Respondent made no showing that ORI actually withheld discoverable documents.

The undisputed facts of this case resoundingly support ORI's proposed remedies and I sustain them for that reason. The remedies sought by ORI are: a ten-year debarment; a ten-year prohibition against Respondent providing advisory services to the Public Health Service; and correction of the research record. All of these remedies are permissible under governing regulations. 42 C.F.R. §§ 93.407(a)(1),(9), (11). The undisputed material facts establish the presence of multiple aggravating factors that amply justify the

length of the debarment and prohibition. The facts clearly establish that Respondent engaged in intentional misconduct or misconduct committed in reckless disregard of the truth. Moreover, Respondent's false deposits into the PDB and publications comprise a pattern of misconduct that extended over a period of nearly a decade.

But, the most damning aspect of Respondent's misconduct is that it corrupted the PDB, a data depository that is widely used by researchers to advance their research and for product development. This misconduct had, or potentially had, a profound impact on Respondent's field of research and the scientific community. Researchers, pharmaceutical companies, and others rely on the PDB, as an honest information source. ORI Ex. 1 at ¶ 151; *see id.* at ¶ 15. As I discussed at the beginning of this decision, the PDB operates on the honor system. Its scientific utility depends on researchers submitting information that is honestly attained and that is not falsified. If even one researcher contaminates the PDB with false information, that calls into question the credibility of the entire database. It jeopardizes the applications of data filed in the PDB by those who rely on the PDB to supply honest information. And, it is reasonably possible that the effectiveness of products developed by those who rely on the PDB could be jeopardized. *Id.* at ¶ 151; ORI Ex. 2 at ¶ 5; *see* ORI Ex. 20 at 14; ORI Ex. 66 at 1.[1]

Indeed, the vulnerability of the system to fraud is underscored by the fact that many relied on Respondent's research to their possible detriment. Respondent's falsified publications were cited at least 622 times by other researchers. ORI Ex. 3 at ¶ 29; ORI Ex. 68. Respondent asserts that all of these citations are proof of the value of his research. To the contrary, those citations show just how easily fabricated results can corrupt others' honest research.

Respondent evinces neither remorse for nor understanding of his misconduct. He continues to assert that he committed no misconduct in the face of a mountain of undisputed facts that prove otherwise. I can only infer from Respondent's continued defiance that he is manifestly untrustworthy and that his untrustworthiness justifies a lengthy debarment and prohibition.

Steven Kessel
Administrative Law Judge

[1] An editorial in the journal *Acta Crystallographica Section D* (D66: 115 (2010)), illustrates the magnitude of Respondent's fraud. It characterizes it as a "scientific scandal of epic proportions [that] shook macromolecular crystallography to its core." ORI Ex. 66. Another journal, *Nature* (462 (24): 970 (2009)) described Respondent's fraud as "the largest ever in protein crystallography." ORI Ex. 65.