

**Worldwide Protein Data Bank Advisory Committee (wwPDB-AC)**  
**Report of October 13<sup>th</sup> 2017 Meeting**  
**RCSB PDB, Rutgers University, New Brunswick, NJ, USA**

**Chair:** R. Andrew Byrd

**PDB Site Representatives (Nominated by wwPDB partner):** Paul Adams (RCSB-PDB), Cynthia Wolberger (RCSB-PDB), Guy Montelione (BMRB), Arthur Edison (BMRB), Sarah Butcher (PDBe), David Brown (PDBe), Kei Yura (PDBj), and Tsuyoshi Inoue (PDBj)

**Ex Officio Community Stakeholder Representatives:** Edward N. Baker (IUCr), R. Andrew Byrd (ICMRBS), Wah Chiu (Macromolecular EM)

**wwPDB Members:** Stephen K. Burley (RCSB-PDB), Jasmine Young (RCSB-PDB), Sameer Velankar (PDBe), John Markley (BMRB), Genji Kurisu (PDBj), Haruki Nakamura (observer for PDBj), Gerard Kleywegt (observer for PDBe).

**wwPDB Associate Members:** Manju Bansal (India), Jianping Ding (China)

**wwPDB-AC E-mail Addresses:**

PDAdams@lbl.gov, cwolberg@jhmi.edu, guy@cabm.rutgers.edu, aedison@uga.edu,  
D.G.Brown@kent.ac.uk, sarah.butcher@helsinki.fi, yura.kei@ocha.ac.jp,  
inouet@chem.eng.osaka-u.ac.jp

**Ex Officio Community Stakeholder E-mail Addresses:**

ted.baker@auckland.ac.nz, byrdra@mail.nih.gov, wahc@stanford.edu

**wwPDB Member E-mail Addresses:**

sburley@proteomics.rutgers.edu, jasmine@rcsb.rutgers.edu, sameer@ebi.ac.uk,  
markley@nmrfam.wisc.edu, gkurisu@protein.osaka-u.ac.jp, gerard@ebi.ac.uk,  
harukin@protein.osaka-u.ac.jp,

**wwPDB Associate Member E-mail Addresses:**

mb@mbu.iisc.ernet.in, jpd ding@sibs.ac.cn

## ***wwPDB AC Meeting, October 13, 2017:***

### **wwPDB Vision Statement**

Sustain a freely accessible, single global archive of experimentally determined structure data for biological macromolecules as an enduring public good.

### **wwPDB Mission Statement**

1. Ensure open access to public domain experimentally determined structural biology data.
2. Provide expert deposition, validation, and biocuration services at no charge to Data Depositors.
3. Enable universal access for expert and non-expert Data Consumers with no limitations on usage.
4. Manage the PDB archive as a public good according to the *FAIR* Principles.
5. Lead the world in structural biology data representation, exchange, and visualization.

The Worldwide Protein Data Bank Advisory Committee (wwPDB-AC) and the leadership of the Research Collaboratory for Structural Bioinformatics (RCSB-PDB), the BioMagResBank (BMRB), the Protein Data Bank in Europe (PDBe), and the Protein Data Bank Japan (PDBj) met at the RCSB, Center for Integrative Proteomics Research, Rutgers University, New Brunswick, New Jersey, USA, on October 13<sup>th</sup> 2017.

The agenda included:

1. Introduction & Overview of the wwPDB;
2. Partner Meetings and Outreach;
3. Macromolecular Crystallography;
4. 3D Electron Microscopy;
5. NMR Spectroscopy;
6. Looking ahead
7. Questions for the AC and general discussion
8. Executive session and feedback

### ***Introduction & Overview of the wwPDB (presented by Stephen Burley)***

The wwPDB has had a very active and successful year, with all partners contributing to the performance throughout the year. The partnership is viewed as strong and synergistic, receiving the full support of the AC. Important milestones to note are:

1. Shift in leadership at PDBj, with Genji Kurisu succeeding Haruki Nakamura. Prof. Nakamura was key to the founding of the wwPDB in 2003, and has led a PDB data deposition center at Osaka University since 2000. The smooth transition of

Prof. Kurisu into this role is applauded by the AC and welcomed by the partners in the wwPDB.

2. The OneDep system has shown continued development, and it has achieved the goal of being the sole deposition interface for all modalities: macromolecular crystallography, NMR, 3D electron microscopy atomic models and, recently, small-angle scattering data (SAS). This is a major milestone for the wwPDB and plays a critical role in the management of the continually increasing depositions to the archive.
3. 2017 has seen rapid growth in the number of deposited structures determined by electron microscopy (3DEM), with the number of depositions now equal to and soon exceeding NMR depositions. The engagement of the 3DEM community by the wwPDB partners is facilitating a smooth process of bringing atomic data from this rapidly growing field into the PDB archive. Significant non-structural roles from NMR studies may impact this area and were discussed as opportunities later in the meeting (*vide infra*).
4. Two important developments discussed at the 2016 AC meeting have been implemented: the process for versioning PDB archive entries and the development of a loosely-coupled Federation of data archives with SASBDB. The latter is critical to future developments in the general area of integrated/hybrid structure determinations.
5. Advances have also been made in the collection of ligand information from depositors and data describing the experimental description of multimeric assemblies.

The number of depositions in the PDB archive continues to grow at an annual rate of roughly 10%, with the total archive expected to exceed 140,000 entries in early 2018. This expansion, and the ability for the wwPDB partners to manage it, is testament to the continual developments in the deposition and biocuration procedures, as well as the confidence and cooperative interaction with the structural biology community across all modalities. It is clear that continued increases in annual depositions, including the growth in the structural biology activities in China and India, will outpace the flat funding under which the wwPDB has operated for the >5 years. This issue is of critical concern to the wwPDB partners and the AC representatives.

The impact of the PDB archive on both the scientific community and the broad lay community is evident in the remarkable use statistics, where the archive logs more than 1.5 million downloads per day from all geographic locations around the world.

The AC reviewed the status of funding for all partners. Each partner is funded independently by its home country or region, and they contribute to the collective operations of the wwPDB from these resources. Funding is expected to be stable for another year, with the next renewals pending for RCSB PDB (late 2018) and BMRB (early 2019). The AC remains in strong support of all partners. Following discussions in the 2016 AC meeting, the partners provided a description of the level of resources (in FTEs) provided to the joint wwPDB activities. The largest efforts are in Software Development and Biocuration/Remediation. The efforts of each partner are contributed

roughly in proportion to the budget and responsibilities of each partner, with RCSB and PDBe contributing the largest shares. Ongoing reporting of activities is vital for the partners' ability to balance and recognize the ongoing commitments and manage the planning for the upcoming year.

***The AC would like to see this FTE reporting continue and recommends that the partners review this table during the year and compare it to the OneDep timeline, as well as other major initiatives, to ensure balance and adjust commitments as needed.***

The OneDep project team has matured and entered a strong phase with clearly defined goals, timeline commitments and management plans. The OneDep project has been viewed as a significant success, especially following the spring 2016 reboot process. The AC enthusiastically endorsed these developments and the cooperation demonstrated by all partners in this joint effort. The goals specified in the timeline are all strongly supported by the wwPDB AC and provide a straightforward monitoring, both by the wwPDB partners and through quarterly reports to the Chair of the AC, for dissemination to the AC members. The AC recommends that the wwPDB maintain a mailing list to facilitate the dissemination of such reports and relevant information to the AC by instruction of the Chair. The OneDep team presented a timetable for managing archive content improvement through versioning procedures and planned remediation efforts in carbohydrate and protein modifications.

In reviewing the impact of OneDep, the AC recognizes that the number of depositions continues to increase while the number of annotators is fixed. The estimate of a 20% increase in efficiency with the full implementation of OneDep may be combined with an anticipated further 10% increase in efficiency from further optimization. However, these gains will only provide the wwPDB with enough capacity to handle the next 2 years.

***The AC supports the wwPDB partners in seeking sustainable approaches to provide for core activity support. Discussion within the wwPDB AC clearly acknowledged that implementing either deposition or user/access fees for the PDB archive would be both inconsistent with the mission of the wwPDB and impracticable. The PDB archive is a common global entity managed through the agreement of the wwPDB partners. It would be completely untenable to all wwPDB operations (data deposition, biocuration/validation, or data download) should service or access fees be instituted, either by one partner or collectively. Doing so would violate the terms of the wwPDB partnership. The wwPDB AC is strongly opposed to any such action. The AC encourages the partners to coordinate and actively pursue sustainable support through grant mechanisms and consideration of donation campaigns.***

***The AC also offers strong support for the ‘research’ or ‘development’ grant support that enables new activities for the wwPDB. Excellent examples of this are the efforts funded in cooperation with the 3DEM community.***

***The AC enthusiastically endorsed these efforts and made several significant suggestions and recommendations for engaging with the carbohydrate scientific community to insure uniformity and coordination of efforts.***

***Continued development of validation tools, particularly for ligands present in structural entries, is strongly supported by the AC.***

***The anticipated/planned implementation of EM molecular structure validation, NMR restraint validation and joint NMR/SAS validation in the timeline for 2018 is strongly supported by the AC.***

## **Partner Meetings and Outreach (presented by Genji Kurisu, PDBj)**

The wwPDB has kept a strong and vigorous presence at major structural meetings around the world. These activities on behalf of the partnership are primarily aimed at the data-in and biocuration activities, while each partner develops their own data-out efforts. The partnership is also sponsoring/organizing a contributed-chapter book highlighting the current state of the art and developments in Integrative Structural Biology with Hybrid Methods, to be published by Springer Japan in 2018. This activity is an excellent example of the leadership role that the wwPDB has assumed in the global structural biology community.

***The AC strongly supports the several publications from the wwPDB partnership describing validation procedures, the new unified deposition system via OneDep and the new developments for the prototype hybrid structure depositions (PDB-Dev).*** In addition to informing the community, these publications establish directions and provide guidance to the community.

A brief description was provided of the wwPDB Foundation. This is an entity with tax-exempt 501(c)(3) status in the USA, which is used to support meeting and interchange activities for the wwPDB that fall outside of the purview of the individual funding sources of the partners. The efforts are critical for the partnerships, and efforts are continuing to solicit support from corporations, and an individual membership program has been launched and is available from the Foundation website.

## **Macromolecular Crystallography (presented by Stephen K. Burley, RCSB)**

Crystallography (MX) continues to be the predominant methodology used in structural determinations and entries. The growth of annual depositions is steady, but the increase has slowed in the last few years. However, there is a clear and dramatic increase in the

complexity of structure and multimeric complexes in the past few years. The growth of structures with molecular weight > 500,000 is quite impressive, as is the increased release of structures with the number of polymer chains >60 and the number of atoms >100000. The archive will contain >120,000 MX entries by the end of 2017.

The X-ray Validation Task Force (VTF) has had a major impact in recent developments at the wwPDB, and this group led the way to the general validation procedures in place today. However, as noted by the wwPDB partners, the VTF is overdue in providing a written report concerning their recommended improvements to ligand validation procedures for structures containing bound ligands.

***The AC supports the wwPDB partners, and encourages them, in getting updated, written recommendations from the X-ray VTF.***

In 2017, the PDBx/mmCIF Working Group met to continue development of the mmCIF data format and to finalize recommendations for diffraction data and ligand refinement restraint data. These developments and improvements are vital to the archive and are strongly supported by the AC.

### **3D Electron Microscopy (presented by Sameer Velankar, PDBe)**

The growth in both the number and quality of EM depositions to the archive reflect the explosion of cryoEM research world-wide. The PDB has been working closely with the community and the Electron Microscopy Data Bank (EMDB) to provide for unified deposition using OneDep in the EM Databank project. The policy and procedures are in place to take structure models into the PDB Archive, with the EM maps being deposited in the EMDB. This coordination has gone extremely smoothly, and it is reflected in the rapidly increasing number of joint depositions into the PDB and EMDB archives. Similarly, the biocuration and validation procedures are drawing upon the established procedures at PDB provided by RCSB PDB, PDBe, and PDBj via OneDep.

As the EMDB is located at the EMBL-EBI, a reorganization has taken place to yield independent teams – PDBe (led by S. Velankar) and EMDB (led by A. Patwardhan). It was noted that there is no formal agreement between the wwPDB and EMDB with regard to data sharing, security and release of information. ***The AC agreed with the wwPDB partners that these issues must be addressed (see below, Question 3).***

The impact of 3DEM structures is reflected in 371 new structures in the first 9 months of 2017, with a projection of >500 entries in the calendar year 2017. This will approximately equal the number of NMR structure depositions in 2017. Overall, there are >1600 3DEM atomic structures in the PDB archive. This correlates with >5300 3DEM maps in the EMDB and 688 new map entries in the first 9 months of 2017.

***The AC recognizes the explosive growth in 3DEM structures and maps, and the implications for the wwPDB are significant. The efforts to date to provide***

***deposition via the OneDep system have been critical to meeting this immediate and growing influx of data.***

OneDep enables uniform processing, with the load balance across RCSB (~50%), PDBe (~35%) and PDBj (~15%), currently.

Validation remains a key issue for 3DEM, a rapidly growing segment of the structural biology community. The major advances made by wwPDB in the other modalities is providing a sound foundation for these efforts, and many of the key leaders in the EM community and the PDB are working together. ***The AC is strongly in support of these activities.*** Structures that are routed to the PDB via OneDep are deposited, biocurated and the structure coordinates are validated. The EMDB performs limited validation of the EM maps and archives the maps.

***The AC supports a more collaborative effort between wwPDB and EMDb to interact with 3DEM stakeholders,*** in addition to the ongoing activities that are funded by NIGMS/NIH in the US and in the UK in the form of the EMDataBank; the Wellcome Trust, EMBL and BBSRC that support the EMDB in the UK, and the EU-INSTRUCT collaboration operating in Europe to support these activities.

***The PDBx/mmCIF Working Group is addressing specific concerns associated with 3DEM-related data matters. This activity is highly encouraged and supported by the AC.*** This is a prime example of the ways in which wwPDB can expand its established protocols, formats, and procedures, to support new structural modalities.

Plans to collaborate with EM stakeholders and to reconvene the EM Validation Task Force are very important to continue the leadership role in this area and to ensure the reliability and quality of the data entering the archive. ***The AC is strongly supportive of this action in the coming year.***

## **NMR Spectroscopy (presented by John Markley, BMRB)**

A review of the protocols for handling NMR data that enters the PDB via OneDep was provided. The data flow differs in part from MX and 3DEM data, in that only a subset of the experimental data associated with a structure determination/deposition is archived in the PDB. The remainder of the data is solicited in the OneDep procedure and sent directly to BMRB for curation and archiving. These data may include resonance assignments without a structure determination, information on dynamics, conformational changes, ligand binding, solvent accessibility and other parameters. When a structure is deposited, the chemical shift assignments and restraints are required to be deposited, and are archived in both the PDB (with the coordinates) and the BMRB.

During the discussion, the AC discerned that there were numerous opportunities for significant interoperability between the data that are held within BMRB but not archived in the PDB. For example, studies of chemical shift effects by ligands, where a structure

of a complex was not determined or deposited, may reside in the BMRB. Establishment of a means to search or cross-reference data between molecules in one data base with all the data on the same or related molecules in the other database would be a significant enhancement. ***The AC supports and encourages the BMRB and PDB partners to work together to explore these possibilities.***

The depositions for structures determined by NMR are steady to slightly decreasing. It is significant to note that, currently in 2017, there are roughly equivalent numbers of depositions of NMR data to BMRB without structures as there are structure depositions. This supports the relevance of cross referencing un-associated NMR studies with structural studies of the same or related proteins/biomolecules. Further, it suggests that BMRB and the NMR community should explore methods to gather greater deposition of NMR data (shifts, titrations, dynamics) that may not be associated with structure determinations. The example of past efforts by all of the wwPDB partners, including BMRB, to enlist the support of journal editors in requiring data deposition could serve as a guideline to achieve this increased deposition to the BMRB archive. ***The AC enthusiastically supported this discussion as a means of broader contribution to the structural biology community. The AC encourages BMRB to take the lead in discussion with journal editors to require deposition into the BMRB of all NMR data reported in a submitted manuscript.*** The AC recognizes that community discussion will be needed to determine what data should be mandatory and what should be desirable yet optional. It is felt that broader NMR data depositions into BMRB would be valuable to other structural biology fields, particularly with the growth of 3DEM structures containing components and ligands, wherein other direct experimental data from independent studies could be beneficial.

The BMRB has been active in the OneDep development project, where a key consideration is the establishment of common formats for restraints used in structure determination by NMR. The BMRB works with two groups, the NMR VTF and an independent group formed to develop the NMR Exchange Format (NEF). NEF was conceived to provide interoperability between software packages; hence, it also provides an opportunity to establish a path to a common restraint format for archiving in the PDB. BMRB has developed software to provide interconversion between NEF and NMR-STAR, thus enabling a common format going forward for all NMR structures. wwPDB will now accept either NMR-STAR or NEF restraint files associated with depositions through OneDep. This policy requires a robust two-way interconversion between NEF and NMR-STAR formats. BMRB will handle processing and preparing these restraints for future validation procedures.

***While progress is being made, the AC strongly encourages heightened focus on resolving all remaining NEF/NMR-STAR issues and advancing the process of validating restraints for NMR structures.***

In the course of discussion, another issue was raised regarding the depositor designation of residues within an NMR structure that are considered disordered, or not defined by the available experimental restraints. This information is presently supplied



and used in the validation software; however, it is not made available in the archive data format. It was revealed that it is contained in the XML format and could be included in the PDBx/mmCIF format files. The point is to provide readily accessible information that could be used in visualization software to inform users of the PDB data. A related issue was raised in discussion, specifically, the disorder associated with ligands in structures of complexes determined by other methods, such as MX. By providing a data field with this information on disorder, visualization software and computational analyses of archive data could provide more insightful interpretation of deposited data, thus increasing the impact of the archive in many different types of studies. ***The AC uniformly supports the inclusion of user designated disorder fields into the mmCIF formatted files.*** Future developments may be considered for providing this based on the ongoing efforts of the Ligand Validation Task Force and other working groups including the EM VTF.

The BMRB has been active in the Hybrid Methods initiatives within the wwPDB, and this is an area where staff have participated in the OneDep efforts. In particular the NMR/SAS hybrid method data handling flowed directly from NMR-STAR and the ability to accommodate SAXS, and other data types. The successful prototyping of hybrid data within OneDep utilizing API calls to SASBDB is an important development, and this should be further explored with other types of data.

***The AC encourages further exploration of these hybrid links, and refers back to the opportunity to link to data within the BMRB that may not be directly associated with other structural entries in the PDB archive. Such developments would demonstrate the power of the wwPDB partnership.***

The role of BMRB in the validation of NMR/SAS hybrid structures awaits further recommendations from the NMR and SAS VTFs. ***The AC strongly encourages a proactive stance by the BMRB in pursuing these recommendations and the establishment of a leadership role in working with the community.***

In the course of discussion, plans related to the funding renewal for BMRB were shared with the AC. The present plan is to bring in a co-PI, Prof. Jeff Hoch (Univ. Connecticut), to plan and contribute to the renewal. This will provide a smooth succession plan for BMRB leadership. Dr. Hoch is well known in the NMR community and specializes in data analyses and data management. His expertise will be very beneficial to the challenges ahead. ***These actions address issues raised by the BMRB AC report. The AC enthusiastically supports these developments and feels the path will strengthen the BMRB and its role in the wwPDB partnership.***

## **Looking Ahead (presented by Sameer Velankar, PDBe)**

The proposals for the OneDep Team in 2017/2018 are ambitious but deemed to all be within reach and appropriate. ***The AC particularly supports the implementation of the Ligand Validation Workshop recommendations.*** It also encourages a broader

review of ways in which structures could be annotated to enhance their value to others, e.g. the discussion related to disorder (see NMR section above).

***The AC is appreciative and fully supports the efforts to develop appropriate deposition and validation tools for the forthcoming XFEL/SFX depositions.***

***The AC strongly supports the implementation of two validation procedures:*** (i) NMR restraint validation, and (ii) EM map validation. This continuation of validation efforts is critical to the complete field of Structural Biology.

There are two substantive remediation efforts planned: Carbohydrates, with RCSB as the lead partner, and Post-translational modifications, with PDBe as the lead partner. The AC was very interested and excited by these efforts, and commends the wwPDB for initiating them. ***In addition, the AC urges the wwPDB to leverage efforts within both the US and the UK/Europe regarding the carbohydrate community***, where parallel efforts are underway that are relevant to several components of the effort, nomenclature, etc. There is opportunity for synergy and coordinated progress that could effectively streamline the process and improve acceptance of the new procedures. ***With respect to Post-translational modifications, the descriptions were very limited. The AC therefore encourages and requests further information in order to be able to provide a clear evaluation.***

Two significant issues for the wwPDB partnership going forward are:

1. Considering admitting EMDB as a partner in the wwPDB
2. Specifying terms for establishing Regional wwPDB partners as a step to expansion.

***The AC is unanimously in support of these actions; specifics are provided below.***

In a general discussion regarding the funding issues facing the partners, it was felt strongly by all AC members that the core activities of the wwPDB are absolutely essential to the scientific community. The impact of losing the ability to keep up with growth in structural depositions would be dramatic, and conveying this to the funding sources is thus critical. Also, the wwPDB partners and the AC discussed the opportunities of seeking non-traditional private sector support, possibly from companies such as Google, Amazon, Facebook. This is separate from the traditional pharma sources, and the impact of the PDB in health and the environment may make such options feasible. The AC provided the partners with some possible avenues to approach these entities.

## **Specific Proposals and Questions for the wwPDB AC**

The wwPDB PIs formulated a list of specific issues for which the advice of the AC was solicited. Each issue was presented and discussed with the full AC, followed by a decision with a recommendation from the AC.

1. **Proposal to take an enhanced approach for DOI resolution of PDB entries as provided by links in journal articles.** There was a good discussion with valuable contributions from the AC on content for the new web link landing site. It was determined that the action of changing the hyperlink at the journal site would be done automatically by the publishers and that the wwPDB would not incur any costs.

*Unanimously approved and supported.*

2. **Proposal to adjust the terms of reference for the Advisory Committee,** including changes to the selection and term of the wwPDB AC Chair and the initiation of the position of Rotating Co-Chair. The wwPDB partners wish to establish a greater degree of independence in the position of Chair of the AC, specifically candidates without prior service/affiliation with one of the wwPDB partners. In order to assist an independent chair, the position of Co-Chair would be created to assist the Chair in organizing the AC meeting. The Co-Chair would be appointed by the wwPDB partner PI who would host the forthcoming AC meeting. A thorough discussion was held and some recommendations to the final language, specifically the length of terms for AC members, provided by the AC to the wwPDB partners. The AC also agreed that there should be limited terms for observers as well.

*Unanimously approved and supported.*

3. **Proposal to enter negotiations with EMDB with the intention to invite the EMDB to become a full partner in the wwPDB organization.**

The AC felt that this was an excellent and timely, if not somewhat overdue, recommendation. The critical nature of the working relationship between wwPDB organization, and EMDB archive team is vital to the future of the PDB and EMDB archives and handling of the growth in the 3DEM field.

The AC asked to review the exact proposal. This proposal will be viewed as distinct from the proposal to consider expansion of the wwPDB with Associate Members (see question 4). It is entered into with full recognition of the substantive nature of the EMDB and the already close working relationship with wwPDB teams on deposition and annotation.

This action will ensure that the rapid expansion of the PDB archive with 3DEM atomic structures will be handled with the most efficient common tools and enable the development, implementation, and continual review of validation tools. This will be a strong action for the structural biology community and have significant impact on the broader scientific user community of the PDB.

***The AC unanimously approved moving forward with discussions between the wwPDB and EMDB, with the request to share the terms of the exact proposal with the AC, prior to implementation of the agreement.***

- 4. Recommendation from the wwPDB Partners on the process for adding Regional wwPDB Partners – with examples being in China and/or India, and ultimately possibly a partner in South America.**

The wwPDB partners laid out a plan for the definition/terms of, selection, and addition of wwPDB Regional Partners. This concept has been discussed at previous AC meetings, and the AC had requested development of a formal proposal. The details were provided in Appendix 4 to the AC members.

Discussion reviewed some of the nuances of establishing the Regional Partners with an initial designation of Associate Member and subsequent transition to Full Member. The AC members provided insights to the wwPDB PIs regarding the expected contribution to the wwPDB from the Associate Member, the specifics of the technologies employed/required and the technical expertise required of the Associate Member, and discussion and consideration of the funding mechanisms for the Associate Members. The discussion points represent primarily clarifications and suggestions to the wwPDB PIs. These will be incorporated in the document describing this Partner. ***The AC is supportive of moving forward and encourages the wwPDB partners to work with the current Regional Representatives from China and India in formulating appropriate and detailed terms, based on the discussions. The resulting refined proposal will be shared with the AC via the Chair, and final approval will be determined by electronic vote/discussion.***

- 5. The wwPDB seeks concurrence with the recommendation to provide Mogul geometry standards for ligands within the context of a PDB entry, as described in Appendix 5.**

Discussion within the AC and with the wwPDB PIs suggested that this is not a significant issue and should be readily accommodated. ***The AC recommends that the wwPDB develop requirements for the procedure, share these with the AC, and then, with the backing and support of the AC, enter into discussions with CCD to clarify the terms of the current agreements. This path will enable the wwPDB to provide the referenced data in concurrence with all existing agreements.***

- 6. Feedback was requested in the issuance and content of the AC reports from RCSB PDB, PDBe, PDBj, and BMRB. These documents were provided in Appendix 6.**

***The wwPDB AC was pleased to receive these reports and feels that it should be a standard procedure. It was stated that it is and will continue to be.***

No significant questions were raised within the AC. The AC felt that questions raised in the BMRB AC report were adequately addressed at this meeting regarding the path forward for funding renewals and succession plans.

There was discussion about the timing of the RCSB AC meeting, currently held in the fall and quite close to the wwPDB AC. The forthcoming renewal creates some complications for shifting the timing of the RCSB AC to the spring; however, it is a goal for RCSB to shift the timing, so that all the partner AC meetings would be held in the first half of the year and the wwPDB AC would remain in the fall. This would provide the opportunity to address recommendations at each partner site and provide this information to the wwPDB AC meeting in the fall. ***The wwPDB AC supports this approach as it can be effected following the present funding renewal.***

- 7. A separate policy matter was raised for discussion by the AC: There are existing structures within the PDB, and the literature, that contain ligands and models for which there is inadequate, or totally missing, electron density. Should the PDB take action to remove or remediate these structures?**

The AC discussed this point and noted that the present validation software does not identify such errors directly; however, the next generation of validation software should enable such problems to be identified readily. One approach to treating this problem is to allow authors of these depositions, should they still be active in the field, to update the entries via the versioning policy. For those that do not avail of this option, the wwPDB will need to consider what other actions could be taken. ***A final decision was not reached; however, the wwPDB is encouraged to monitor the situation, to determine its scale (how many entries, etc.), so that the subject can be available for consideration at the next AC meeting.***