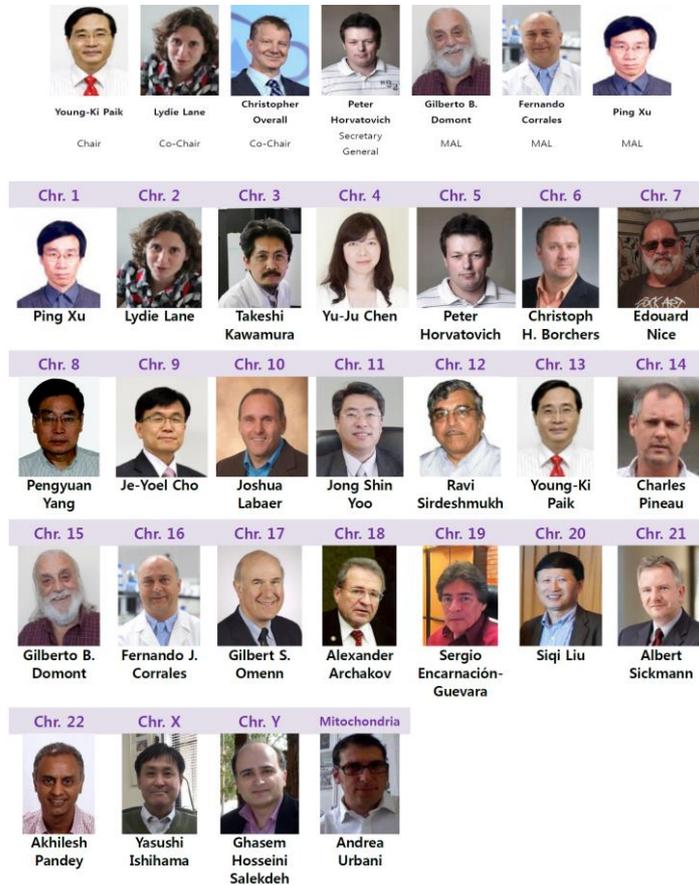


The C-HPP Activity Report for 2018 HUPO Council

Date: July 31, 2018

1. Name of committee: Chromosome-Centric Human Proteome Project (C-HPP) Consortium
2. Name of committee chair: Chair: Young-Ki Paik, Co-chairs: Lydie Lane, Christopher M Overall
3. Names of committee members: including new members and members that rotated off this year

C-HPP Executive Committee Members and Principal Investigators Council Members



4. C-HPP Mission and Objectives (latest updated: July 31, 2018)

The mission of the C-HPP is to map and annotate the entire human protein parts list encoded by each chromosome. The initial steps of the project are focused on the “missing proteins” (MPs), which lacked documented evidence for existence at protein level. At present, there remain 2,168 MPs (neXtProt 2018-01-17). Also targeted are alternative splice isoforms, proteoforms, post-translational modifications (phosphorylations, glycosylations, acetylations), small open reading frame ORF translation products (smORFs) and translatable products of long non-coding (lnc) RNAs.

5. Summary of recent accomplishments, current activities, tasks (see C-HPP Newsletter No. 7, 2018)

A. neXt-CP50: On March 1, 2018, the C-HPP Consortium has launched the neXt-CP50, which aims to characterize 50 uPE1 out of 1260 uPE1 proteins of unknown function within 3 years by 14 C-HPP teams in collaboration with the members of HUPO initiatives (B/D-HPP, PSI, Resources Pillar) and proteomics community.

Rationale: This initiative is a pilot project which aims to evaluate the feasibility of a large project by characterizing up to 50 uPE1 proteins within three years. Using the neXtProt advanced query system (query NXQ_00022 (<https://goo.gl/Wf2Qnn>)), we retrieved 1,937 proteins with no annotated function and that account for ~10% of the total number of human proteins. This remarkable number of proteins implies a vast amount of unidentified new biology.

Table 1: Current teams participated in neXt-CP50 Initiative*

Chr.	PI Name	Total*	1 st priority	1 st period	Comments
2	Lydie Lane	80	5	2018~2019	Cross chromosome targets
3	Takeshi Kawamura	56	2	2018~2020	
4	Yu-Ju Chen	53	2	2018~2020	
9	Je-Yoel Cho	57	2	2018~2019	Simultaneous targeting both MPs and uPE1
10	Joshua LaBaer	61	2	2018~2020	
11	Jong Shin Yoo	70	2	2018~2020	
13	Young-Ki Paik	26	5	2018~2021	CRISPR/cas9 target approach
15	Gilberto Domont	44	2	2018~2020	
16	Fernando Corrales	54	2	2018~2021	
17	Gilbert S Omenn	66	17	2018-2020	Development and application of bioinformatics tool for prediction of uPE1 function (e.g., combo of I-TASSER and COFACTOR)
18	Alexander Archakov	14	2	2018~2020	
19	Sergio Encarnación-Guevara	68	2	2018~2019	
20	Siqi Lui	35	4	2018~2020	
Y	Ghasem Hosseini Salekdeh	1	1	2018~2020	
Total	neXt-CP50 Target Numbers		50	2018~2021	

*Ref. Paik, Omenn, Hancock, Lane and Overall, 2017, *Expert Rev Proteomics, Advances in the Chromosome-Centric Human Proteome Project: looking to the future*, 14:1059-1071, DOI: [10.1080/14789450.2017.1394189](https://doi.org/10.1080/14789450.2017.1394189)

B. 19th C-HPP Symposium/Workshop in Santiago de Compostela, Spain

The 19th C-HPP Symposium/workshop organized by Fernando J. Corrales, Concha Gil and Young-Ki Paik was held in conjunction with the EuPA 2018 Congress with a scientific theme, “Translating Genome into Biological functions”. During this meeting, PIs or associate members of thirteen Chromosome teams (Chr 2, 5, 6, 9, 11, 13, 14, 15, 16, 17, 18, X and Mt.) presented their progress on missing protein identification and uPE1 (PE1 proteins of unknown function) characterization. The workshop program started with an update of the Human Proteome Project by Gilbert Omenn, HPP Chair and Chr 17 PI, neXt-CP50 initiative, by Young-Ki Paik, C-HPP Chair and Chr 13 PI, Outline of C-HPP 2.0 draft by Chris Overall, Co-Chair of C-HPP, Status of neXtProt as well as examples of uPE1 study by Lydie Lane, Chr 2 PI, Co-Chair of C-HPP and progress reports on each team by participating PIs and Young Investigators. The final session was devoted to discussion on the C-HPP organization long-term plans. (details on the presentations are seen at HUPOST July & August Issues, <https://hupo.org/HUPOST>; and C-HPP wiki, <https://c-hpp.webhosting.rug.nl/tiki-index.php?page=HomePage>).



C. Publication of 2017 JPR SI (27 papers)

This annual special issue (SI) is the fifth since publication of the first C-HPP edition in January 2013; 164 C-HPP-related papers including 27 papers in this issue have now published with focus on (1) progressively completing the human protein parts list and (2) advancing the usefulness of proteomics for the broader community in the subject of missing proteins, identification of biology/disease related proteins. C-HPP HQ office has freely distributed one copy of printed version to all C-HPP PIs and HPP leaders by regular mail.

Selected highlights from this C-HPP Newsletter are:

- Reporting two C-HPP PIC decisions with respect to future directions of C-HPP consortiums made in HUPO 2017, Dublin: (1) an extension of C-HPP period to 2027: (2) launch of neXt-CP50 challenge: This aims to discover function(s) of 50 PE1 proteins of unknown functions termed uPE1 by Chromosome-centric approach in three years (list of uPE1 is available in neXtProt using SPARQL query [NXQ_00022](#)).
- Prospective article of Ekaterina Poverennaya and Andrey Lisitsa from Orekhovich Institute (Moscow, Russia, Chromosome 18 team) on the use of various gene editing technologies to study of uPE1 functions in cell lines.
- Lydie Lane from SIB provides a summary on the new neXtProt release (2018-1-17). Noted were an increase of PE1 proteins from 17008 to 17470 compared to the previous release (2017-1-17) and list new features of neXtProt such as viewing SRM peptides of human proteins and new SPARQL queries to list high proline content proteins ([NXQ_00225](#)). For the detection claim of missing proteins, it usually requires at least two uniquely mapping peptides with length larger than 9 amino acids ([NXQ_00226](#)). However, in identifying proteins with experimentally determined long alpha helices (defined as a length longer than 75 amino acids), the new release provides an example query of proteins having a specific secondary structure (NXQ_00230).

C. HPP Terminology on the web: To define those scientific terms used in HPP, HUPO HPP EC recently released the term definition glossary on the web. You will find this by clicking the below link.

<https://hupo.org/resources/Documents/HPP%20Scientific%20Terms%20Definitions%20and%20Abbreviations.pdf>

6. List of activities in progress, milestones, upcoming events:

A. C-HPP 2.0 Plan: As C-HPP is completing Phase I (2012.9-2018.9) with many notable accomplishments, it was necessary to draft a new plan called **C-HPP 2.0** which lays out the future scientific direction and immediate action items during Phase II (2018.9 ~ 2021.9). This plan shall include reorganization of the teams, refined goals and milestones by encompassing our experience and research accomplishment during the Phase I (2012-2018). This plan (still in draft version) will be released in Orlando HUPO congress.

B. Journal of Proteome Research SI (to be published on December 2018): Continuing our scientific endeavors toward missing proteins annotation and functional characterization of uPE1 protein (PE1 protein of unknown function), we now have received 38 manuscripts as of July 31st. The contents in this JPR SI (Associate Editor, Chris Overall: Guest Editors-Paik, Omenn, Corrales, Deutsch, Weintraub) will include more in-depth studies of missing proteins and uPE1 proteins with respect to biology, diseases, and technology developments. As papers are accepted they will go online and so most will be available in time for HUPO-2018 in Orlando.

7. Future goals, vision of committee

Given the launch of neXt-CP50 this year, the C-HPP will be moving toward the functional characterization of uPE1 while the current efforts on the missing proteins are maintained with enhanced strategies and workflows. In the long run, C-HPP scientists will engage more with functional study of 2000 uPE1s, ~10% of whole human proteins, by incorporating the lessons from Phase I (2012-2018) and a pilot neXt-CP50. To this end, all issues including the public funding, major teams, development of technologies and deliverables will be discussed in Orlando congress as well as 21st St Malo C-HPP symposium/workshop (hosted by Charles Pineau, PI of Chr 14) on the middle of May 2019.

8. Financial impacts and/or requests (if appropriate)

HUPO may consider provide with some financial support for the scientific workshops for both C- and B/D-HPP in next year in order to promote HPP.

9. Recommendations to the HUPO Council and Executive Committee

As the central activity of C-HPP for the past 6 years (2012-2018) has been supported by the Korean Government funds (to YKP), it becomes now important that HUPO HQ and EC may write an open letter of support for C-HPP activity as well as B/D-HPP to each country's granting agency. Perhaps, HUPO elaborates this effort by contacting all 25 PIs and find out what type of endorsement needed for each team. Each PI will give some info on the direct contact person for this purpose (e.g., granting agency's name etc.). This will greatly help each HPP team to promote its scientific activity.