### Functional analysis of AP2 transcription factors from the dominant Antarctic moss *Sanionia uncinata*

Mi Young Byun<sup>1</sup>, Mira Park<sup>1</sup>, Hyun Park<sup>1,2</sup>, Anja Kuberski<sup>3</sup> Eva L. Decker<sup>3</sup>, Ralf Reski<sup>3</sup> and Hyoungseok Lee<sup>1,2</sup>

<sup>1</sup>Unit of Polar Genomics, Korea Polar Research Institute, Incheon, South Korea

<sup>2</sup>Polar Science, University of Science & Technology, Daejeon, South Korea

<sup>3</sup>Plant Biotechnology, Faculty of Biology, University of Freiburg, Freiburg, Germany

Antarctica is one of the most extreme conditions for plant growth and its vegetation is mainly dominated by bryophytes. The mosses in Antarctica grow mostly in coastal areas and are expected to have developed various unique physiological/molecular mechanisms to survive in extreme environments. *Sanionia uncinata* (Hypnales; Amblystegiaceae) is a dominant moss species in the maritime Antarctic and considered as a good target species to investigate genes associated with abiotic stress tolerance of mosses. In this study, we aimed to select and characterize function of a key transcription factor which induces the cold tolerance process in *S. uncinata* at the molecular level. Based on the transcriptome analysis, we could find twenty genes containing AP2 DNA binding domain, showing transcriptional induction in response to cold stress treatment  $(2^{\circ}C)$ . To characterize their functions related to cold tolerance, we generated transgenic plants which constitutively express *SuAPL* genes using the model moss *Physcomitrella patens*, exhibiting significantly lower cold tolerance in terms of electrolyte leakage under freezing conditions, compared to wild-type. In addition, their protonemal

growth was accelerated below  $8^{\circ}$  indicating enhanced cold tolerance, while the gametophore development was considerably retarded. These results suggest that SuAPL have important functions in cold adaption of *Sanionia uncinata* to extreme Antarctic environments and they can cause multiple effects in abiotic stress tolerance and in stem cell development of mosses as well.

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# 2018 International Conference of the Korean Society of Plant Biologists

### November 8(Thu)-9(Fri), 2018 Hotel Nongshim, Busan, KOREA



KOREAN SOCIETY OF PLANT BIOLOGISTS

Agricultural Biotechnology Research Center SAC Systems & Synthelic Agrobiotech Center

2018 International Conference

of the Korean Society of Plant Biologists

### [GM63]

### Functional analysis of AP2 transcription factors in Antarctic moss Sanionia uncinata

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\*Corresponding Author email : soulaid@kopri.re.kr

### [GM64]

### De novo assembly and transcriptome analysis of the moss Sanionia uncinata in response to relative water content reduction in the Antarctic natural habitat

Mira Park<sup>1,2</sup>, Byeong-ha Lee<sup>2</sup>, Hyoungseok Lee<sup>\*1,3</sup>

<sup>1</sup>Unit of Polar Genomics, Korea Polar Research Institute, Incheon, South Korea <sup>2</sup>Department of Life Sciences, Sogang University, Seoul, South Korea <sup>3</sup>Polar Science, University of Science & Technology, Daejeon, South Korea

Sanionia uncinata is one of the dominant moss species in the maritime Antarctic. This extremophile plant has been used as an important model organism for studying stress tolerance responses. Plants generally undergo physiological changes response to drought stress but little is known about dehydration responses of S. uncinata. Transcriptomic characterization is necessary for identifying genes involved in stress adaptation of an Antarctic moss, S. uncinata, to extreme environment. Total RNA was prepared from the gametophore under three different drying conditions (Wet, Semi-dry, and Dry) and subjected to RNA-Seq analysis. This study demonstrated a number of differentially expressed genes under dry condition compared Semi-dry and Wet conditions. We have identified differentially expressed genes that showed a significant response dehydration. The physiological process most affected by water gradient at the molecular level was photosynthesis. This over survey of transcripts and stress-relevant genes can contribute to understanding the stress-resistance mechanism of Antarces moss and will accelerate the practical use of the genetic resources for this organism.

\*Corresponding Author email : soulaid@kopri.re.kr



November 7(Wed)-9(Fri), 2018 Hotel Nongsim, Busan, KOREA



# **Plenary Lecture**

### Nov. 8 (Thu)



Genome editing to enhance maize yield traits David Jackson (Cold Spring Harbor Lab)



Translational control of phloem development by RNA G-quadruplex/JULGI determines plant sink strength Ildoo Hwang (POSTECH)



MPK6-mediated regulation of MYB46 activity on secondary cell wall biosynthesis Kyung-Hwan Han (Michigan State University)



Cellular precision for cell surface integrity and cell fate control June M. Kwak (DGIST)





Strigolactone biosynthesis and action Shinjiro Yamaguchi (Kyoto University)



Molecular mechanism of gravity signaling in gravitropism Miyo Terao Morita (Nagoya University)



Light signaling in the understory Giltsu Choi (KAIST)



Epigenetic switch from repressive to permissive chromatin in response to cold stress

Dae-Jin Yun (Konkuk University)



TBA Yuehui He (Chinese Academy of Sciences)



ABA RESPONSIVE ELEMENT-BINDING FACTOR 3 and 4 act with the NF-Y complex to regulate SOC1 transcription and modulate flowering in Arabidopsis

Ji Hoon Ahn (Korea University)



KSPB Excellence Award Lecture



Genetic regulations of chlorophyll degradation, leaf senescence and abiotic stress tolerance Nam-Chon Paek (Seoul National University)



Xuelu Wang (Huazhong Agricultural University), Hojin Ryu (Chungbuk National University), Sangho Lee (Sungkyunkwan University), Mei Wang (Shandong University)



Nam-Chon Paek (Seoul National University), Jing Bo Jin (Chinese Academy of Sciences), Zheng-Yi Xu (Northeast Normal University), Jin Hoe Huh (Seoul National University)



Session 4

Rosa Lozano-Duran (Chinese Academy of Sciences), Sang Hyon Kim (Myongji University), Abel Rosado (University British Columbia), Sung Un Huh (Kunsan National University)

Jeong-Il Kim (Chonnam National University), Sun-Hwa Ha (Kyung Hee University), Hong-Kyu Choi (Dong-A University), Sang-Tae Kim (Institute for Basic Science)

# **invitation** Welcome to KSPB



회원 여러분 안녕하십니까.

2018년도 한국식물학회 정기학술대회가 오는 11월 8일(목)부터 9일(금)까지 부산 농심호텔에서 개최 됩니다.

올해 정기학술대회는 Dr. David Jackson (Cold Spring Harbor), Dr. Xuelu Wang (Huanzhou Agricultural University), Dr. Shinjiro Yamaguchi (Kyoto University), Dr. Yuehui He (Chinese Academy of Sciences) 등 연구 업적이 탁월한 외국 식물학자들의 Plenary Lecture를 포함하여 24명의 국내외 저명 학자들의 구두 발표와 함께 한국식물학회 최우수 학술상 수상 강연이 예정되어 있습니다. 또한 300편 이상의 포스터 발표를 예상하고 있으며, 예전과 같이 대학원생들을 위한 우수포스터상, JPB 논문상, 학술발전상, 미래과학자상 등의 시상이 예정되어 있습니다.

이번 정기학술대회도 식물학 및 농업생명과학 분야의 최신 정보를 접하고, 회원 여러분들의 연구 결과를 토론하고 상호 정보를 교환하며, 회원들 간의 친목을 도모하는 풍성한 결실의 장이 될 수 있도록 회원 여러분들의 적극적인 관심과 참여를 간곡히 부탁드립니다.

끝으로 성공적인 학술대회 조직과 운영을 위해 노력해 주신 전종성 부회장/학술위원장님을 비롯한 학술운영위원과 심포지엄 조직을 위해 수고하신 모든 운영위원님들께 감사드립니다.

아직 남아있는 여름의 끝자락 더운 날씨에 회원 여러분의 건승을 바라며, 11월 부산에서 뵙겠습니다. 감사합니다.

사단법인 한국식물학회 회장 7 등 근 등

KOREAN SOCIETY OF PLANT BIOLOGISTS

## **2018** International Symposium on Plant Sciences & the Annual Conference of the Korean Society of Plant Biologists

Date	November 7 (Wed.) - 9 (Fri.), 2018	
Place	Hotel Nongshim, BUSAN, KOREA	
Organizers	The Korean Society of Plant Biologists	
Pre-Registration	Sept. 4 (Tue.) - Sept. 30 (Sun.) <a href="https://www.kspb.kr/main.html?sub=2&amp;pg=regist">www.kspb.kr/main.html?sub=2&amp;pg=regist</a>	
Abstract submission	Sept. 4 (Tue.) - Sept. 30 (Sun.) ✓ www.kspb.kr/main.html?sub=2&pg=regist3_list_	

# **Organize Committee**

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주 최	한국식물학회(KSPB)

# 2018 International Symposium on Plant Sciences & the Annual Conference of the Korean Society of Plant Biologists



### Program

### 🔁 Nov. 7 (Wed) \_\_\_\_\_

Time	Session	Chair
16:00~18:00	Registration	
18:00~20:00	KSPB Board meeting	

### 🔁 Nov. 8 (Thu) \_\_\_\_\_

Time	Session	Chair	
08:00~09:40	Registration & Poster hanging		
09:40~09:50	<b>Opening Address</b> Hunseung Kang (President of KSPB)	Jong-Seong Jeon (Kyung Hee Univ)	
09:50~10:40	Plenary Lecture 1Genome editing to enhance maize yield traitsDavid Jackson (Cold Spring Harbor Lab)Translational control of phloem development by RNA G-quadruplex/JULGI determines plant sink strengthIldoo Hwang (POSTECH)	Jae-Yean Kim (Gyeongsang Nat'l Univ)	
10:40~11:00	Coffee Break		
11:00~12:15	<u>Plenary Lecture 2</u> MPK6-mediated regulation of MYB46 activity on secondary cell wall biosynthesis Kyung-Hwan Han (Michigan State Univ)		
	<b>Cellular precision for cell surface integrity and cell fate control</b> June M. Kwak (DGIST)	Jae-Heung Ko (Kyung Hee Univ)	
	ABA RESPONSIVE ELEMENT-BINDING FACTOR 3 and 4 act with the NF-Y complex to regulate SOC1 transcription and modulate flowering in Arabidopsis Ji Hoon Ahn (Korea Univ)		
12:15~14:30	Lunch & Poster Session, Photo Time		

Session I			
Time	Session	Chair	
14:30~15:50	Brassinosteroid signaling Xuelu Wang (Huazhong Agricultural Univ)		
	Brassinosteroid-controlled intracellular auxin homeostasis is essential for xylem differentiation and secondary growth Hojin Ryu (Chungbuk Nat'l Univ)	Inhwan Hwang	
	Structural basis for modulation of the ABA core signaling by ABA and its analogs in rice Sangho Lee (Sungkyunkwan Univ)	(PUSTECH)	
	SR01 fine tunes mitochondrial retrograde signaling Mei Wang (Shandong Univ)		
15:50~16:10	Coffee Break		

### Session II

Time   Session   Characteristic     KSPB Excellence Award Lecture :   Genetic regulations of chlorophyll degradation, leaf senescence and abiotic stress tolerance   Characteristic	air
KSPB Excellence Award Lecture : Genetic regulations of chlorophyll degradation, leaf senescence and abiotic stress tolerance	
Nam-Chon Paek [Seoul Nat'l Univ]	
The histone H3K4 demethylase JMJ16 represses leaf senescence in Arabidopsis Byeong   16:10~17:30 Jing Bo Jin (Chinese Academy of Sciences) (Sogar)	<b>Byeong-ha Lee</b> (Sogang Univ)
Arabidopsis Histone H3K4 Demethylase JMJ17 Functions in Dehydration Stress and Abscisic Acid Responses Zheng-Yi Xu (Northeast Normal Univ)	
<b>Roles of DNA methylation in genome stability in animal and plant cells</b> Jin Hoe Huh (Seoul Nat'l Univ)	
17:30~18:00 KSPB General Assembly	
18:30~20:00 Banquet	

### 🖾 Nov. 9 (Fri) \_\_\_\_\_

Time	Session	Chair
09:40~10:55	<u>Plenary Lecture 3</u> <co-organized by="" group="" mobile="" phytochrome="" research="" signaling=""></co-organized>	
	<b>Strigolactone biosynthesis and action</b> Shinjiro Yamaguchi (Kyoto Univ)	Moon-Soo Soh
	Molecular mechanism of gravity signaling in gravitropism(Sejong Univ)Miyo Terao Morita (Nagoya Univ)	
	Light signaling in the understory Giltsu Choi (KAIST)	
10:55~11:10	Coffee Break	
11:10~12:00	Plenary Lecture 4   Epigenetic switch from repressive to permissive chromatin in response to cold stress   Dae-Jin Yun (Konkuk Univ)   TBA   Yuehui He (Chinese Academy of Sciences)	<b>Yoo-Sun Noh</b> (Seoul Nat'l Univ)
12:00~14:30	Lunch & Poster Session	

Session III			
Time	Session	Chair	
14:30~15:50	Pathogen effectors as probes: a multifunctional viral protein sheds light on the cell-to-cell spread of RNAi and chloroplast-mediated defences Rosa Lozano-Duran (Chinese Academy of Sciences)	Ohkmae K. Park	
	<b>Role of NMD in Arabidopsis PTI and ETI</b> Sang Hyon Kim (Myongji Univ)		
	Understanding the roles of ER-PM contact sites remodeling on ionic[Kore.stress toleranceAbel Rosado (Univ British Columbia)		
	<b>New Face: Atg8 interactors in plant immunity</b> Sung Un Huh (Kunsan Nat'l Univ)		
15:50~16:10	Coffee Break		

### Session IV

Time	Session	Chair
16:10~17:30	<b>Plant light signaling mediated by phytochrome kinase activity</b> Jeong-Il Kim (Chonnam Nat'l Univ)	
	Engineering of Anabolic and Catabolic Pathways for High Carotenoid Content in Rice Sun-Hwa Ha (Kyung Hee Univ)	
	Construction of a bioinformatic platform for genomics-assisted breeding of legume crops Hong-Kyu Choi (Dong-A Univ)	(Kyung Hee Univ)
	<b>CRISPR-Cas9 mediated base editing: a case study of cytosine base editing inducing a point-nonsense mutation in <i>Arabidopsis</i> Sang-Tae Kim (Institute for Basic Science)</b>	
17:30~17:50	Closing Remark & Poster Awards	



2018 International Symposium on Plant Sciences & the Annual Conference of the Korean Society of Plant Biologists 2018 International Symposium on Plant Sciences & the Annual Conference of the Korean Society of Plant Biologists

### **Information Briefing**



- 사전등록 등록 기간 : 9월 4일(화) ~ 30일(일)
- 초록 등록 기간 : 9월 4일(화) ~ 30일(일)
- 등록비 안내

회원구분		참가등록비	
		사전등록비	현장등록비
히의	정회원/일반회원	150,000원	160,000원
외면	학생회원	110,000원	120,000원
비회원	교수급/일반	180,000원	190,000원
	학생	120,000원	130,000원

1) 사전등록 및 초록 등록은 홈페이지를 통한 온라인으로만 신청 받습니다.

• 등록방법

사전등록 접수 바로가기 ▶ www.kspb.kr/main.html?sub=2&pg=regist

- 2) 회원 등록비로 할인은 2018년도 연회비를 납부하신 후 받으실 수 있습니다.
- 3) 등록비에는 학술대회 강연 및 리셉션 참가비와 초록집이 포함되어 있습니다.
- 4) 등록비 결제 방법
  - 카드 결제 : 식물학회 홈페이지 → 학술대회 → 사전등록 → 카드결제
  - 통장 입금 : 농협 301-0107-8266-01 한국식물학회(사전등록 후 입금 요망) (통장 입금시 "등록비 홍길동"양식으로 입금 부탁드립니다.)
- 5) 영수증은 홈페이지 사전등록확인에서 발급 받으실 수 있습니다.

• 문의처: Tel 02) 884-0384, E-mail kspb@kspb.kr



• 포스터 전시용 보드 크기는 100 cm x 180 cm입니다.

• 전시장소는 현장에서 안내해 드립니다.

2018 International Symposium on Plant Sciences & the Annual Conference of the Korean Society of Plant Biologists

### **Information Briefing**



#### GM : Genetics/Molecular Biology

- DP : Development/Physiology
- ST : Signal Transduction
- ETM : Environment/Ecology/Taxonomy/Morphology
- PB : Plant Biochemistry

#### 초록 작성 안내

- 1) 저자 인원을 선택한 뒤, 저자 정보를 입력합니다. 저자이름은 First name(이름), Last name(성) 순으로 fullname을 표기하셔야 합니다.
- 2) 저자 순서: 화면에 보이는 대로 저자 순서가 반영되며, 처음 입력하는 저자가 First Author입니다. 교신저자 (Corresponding author)는 Corresponding author 표시 박스에 체크해주시기 바랍니다. 공동 교신저자의 경우 에도 저자의 Corresponding author 표시 박스에 체크해주시면 됩니다.
- 3) 소속 기관은 소속 기관 개수를 선택한 뒤에 영문으로 학과, 소속기관, 도시명, 우편번호, 국가 순으로 입력 하시기 바랍니다. 한 저자의 소속기관이 2개 이상일 경우, 각 각의 소속의 번호를 저자명 옆에 표시해주시면 됩니다.

#### 초록 전문

- 1) 포스터 발표 초록 본문은 반드시 영자 1,200자 (여백 포함) 이내로 작성하여 주십시오.
- 2) 약어 사용 시는 IUBMB에 의한 표준약어나 국제적으로 널리 통용되는 것만을 사용하시고, 부득이한 경우에는 첫 번째 나오는 약어 옆에 full spell을 괄호 안에 넣어 주시기 바랍니다.

#### • 우수포스터 시상

우수포스터상은 정기학술대회에서 발표하는 포스터 중 우수한 내용의 포스터를 10 편 선정하여 시상하는 행사 입니다. 우수포스터에 선정되면 상장 및 상금이 수여됩니다. 수상자 선정은 우수포스터상 평가위원이 행사장에서 직접 평가하여 결정되며, 시상식은 장소는 현장에서 안내해 드립니다.

### 초록 예문

### Role of Arabidopsis Jumonji-domain Proteins in the Regulation of Flowering Time

Ju Hee Jeong<sup>1</sup>, Hae Ryong Song<sup>1</sup>, Ji Yeon Hong<sup>1</sup>, Bosl Noh<sup>3</sup>, and Yoo Sun Noh<sup>1, 2, \*</sup>

<sup>1</sup>School of Biological Sciences, Seoul National University, Seoul 151–747, Korea.

<sup>2</sup> Plant Genomics and Breeding Institute, Seoul National University, Seoul 151–742, Korea.

<sup>3</sup> Research Institute of Basic Sciences, Seoul National University, Seoul 151–747, Korea.

Methylation is an important posttranslational modification of histone proteins that affectschromatin-based processes including transcriptional regulation, DNA repair, X-chromosome inactivation, and epigenetic inheritance. Until recently, histone methylation has been considered an irreversible modification, but the identification of histone demethylases has revealed that this modification can be dynamically regulated. So far, the majority of histone demethylases characterized have come from mammals and budding yeast. The lar but group of these histone demethylases shares the Jumonji (Jmj) s domain as their core catalytic domain. However, little has been known on the role of Jmj proteins in Arabidopsis. There are n genes encoding Jmj proteins in the Arabidopsis genome. Our previous studies have shown that two of these Jmj proteins, ELF6 and REF6, have distinctive roles in the regulation of floral transition through affecting the photoperiod- and FLC-dependent pathways, respectively. Here we report that another *Arabidopsis* Jmj protein is involved in photoperiod-dependent floral regulation possibly through regulating the transcription of *FT*.

\* Corresponding author Email : ysnoh@snu.ac.kr

### Direction



#### 지하철

- ▶ 지하철 1호선 온천장역 하차 1번 출구 또는 3번 출구 이용 후 도보 (5분~7분)
- ▶ 1번 출구가 찾기에 용이합니다.

#### 철도

- ▶ 부산역 하차 →지하철 1호선 온천장역 하차
- ▶ 구포역 하차 → 지하철 3호선에서 1호선 환승 후 온천장역 하차

### 버스

► 46, 49, 50, 51, 77, 80, 100, 100-1, 110, 110-1, 121, 130, 144, 179, 183, 189, 203, 1002, 1008

### 고속버스

- ▶ 시외버스 터미널 (노포동) 하차
- ▶ 지하철 이용 온천장역 하차
- ▶ 버스 80번 이용 후 온천장역 하차

### 비행기

- ▶ 김해공항 하차 → 307번 직행버스 → 만덕터널 → 내성로터리 하차
- → 지하철( 동래역 → 온천장), 택시이용

### 자가용

- ▶ 경부고속도로 이용 시 : 부산 톨게이트 통과, 첫번째 신호등에서 직진 약 4Km
- ▶ 남해고속도로 이용 시 : 북부산 톨게이트 통과, 만덕 방향으로 운행 → 2터널 통과 후 좌회전 약 3Km



2018년 한국식물학회 정기학술대회가 아래와 같이 개최되오니 소속 회원 및 발표자들이 참가할 수 있도록 출장을 허락하여 주시기 바랍니다.

- 일시: 2018년 11월 7일(수) 11월 9일(금)
- 장 소 : 부산 농심호텔

# 사단법인 **한국식물학회**

