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Ploidy Diversity in the *Arisaema ovale* Group and the *A. nikoense* Group (*Araceae*)

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Diversity of ploidy levels in the *Arisaema ovale* group and the *A. nikoense* group (*Araceae*), two monophyletic groups sister to each other in the molecular phylogenetic relationship of the genus, was extensively examined throughout their distribution ranges with DNA flow cytometry and microscopic observations of the chromosomes. In *A. ovale*, hexaploids with 2n = 78, morphologically indistinguishable from previously known tetraploids and pentaploids, were newly found from Aomori Prefecture and Hokkaido. Diploid plants that were previously known only from Shizuoka Prefecture, were newly found from Iwate and Fukushima Prefectures. *Arisaema inaense* (Seriz.) Seriz. ex K. Sasamura & J. Murata and *A. nagiense* T. Kobay., K. Sasamura & J. Murata are confirmed to be diploid (2n = 26). Based on the results, a revised hypothesis for the diversity of the *A. ovale* group reflecting the increase of ploidy level is presented. In the *A. nikoense* group, *A. nikoense* Nakai was confirmed to be diploid (2n = 28) and all samples including subsp. *alpicola*, subsp. *australe*, subsp. *brevicollum*, and subsp. *nikoense* var. *nikoense* and var. *kaimontanum* Seriz. were found to be diploid. Consequently, the *A. nikoense* group is considered to have stayed at diploid level irrespective of the remarkable morphological and geographical diversity.

Key words: *Arisaema nikoense*, *Arisaema ovale*, chromosome numbers, flow cytometry, polyploidy.

The genus *Arisaema* Mart. (*Araceae*) comprises nearly 200 taxa (Gusman and Gusman 2006) including 53 species in Japan (Murata et al. 2018). The genus was recently classified into 15 sections based on the phylogenetic relationship (Ohi-Toma et al. 2016), in which most of the Japanese species belong to sect. *Pistillata* (Engl.) Nakai. The genus shows a variation in chromosome numbers (cf. Murata et al. 2014, 2018, Hayase et al. 2019). Most taxa are diploids and their chromosome numbers are 2n = 28, but other chromosome numbers at the diploid level (2n = 16, 20, 22, 24, 26, and 30) were known. Several tetraploid species (2n = 48 or 56), and one hexaploid species (2n = 72) were also reported. In addition, the intraspecific pair of diploid and tetraploid (or triploid) was observed from several species (mostly 2n = 28 and 56; rarely 2n = 28 and 42). Polyploid series within a species were reported from *A. amurense* Maxim. (2n = 28, 56, and 70), *A. heterophyllum* Blume (2n = 28, 56, 84,

1300–1400 m), K.Sasamura SK685, SK686, SK687, SK688, SK689, SK690; Ina (alt. 1350 m), K.Sasamura SK708 (2n = 26), SK709, SK710; Hotaka (alt. 1160–1170 m), K.Sasamura SK748, SK749, SK750, SK751.

Arisaema nagiense Tom.Kobay., K.Sasam. & J.Murata. **Diploids estimated** – **Okayama**: Mt. Nagi (alt. 1200 m), K.Sasamura & al. SK532 (2n = 26), SK538.

The *Arisaema nikoense* group (all specimens were estimated to be diploid)

Arisaema nikoense Nakai subsp. ***nikoense*** var. ***nikoense*** – **Aichi**: Mt. Chausu (alt. 1300 m), K.Sasamura s.n. **Shizuoka**: Umegashima (alt. 1400 m), K.Sasamura SK840, SK841, SK842, SK843, SK844, SK845, SK846. **Nagano**: Iijima (alt. 1300–1400 m), K.Sasamura SK699 (2n = 28), SK700, SK701, SK702; Ina (alt. 1350 m), K.Sasamura SK715, SK716, SK717; Yamanouchi (alt. 1700 m), K.Sasamura SK837, SK838, SK839.

Subsp. ***nikoense*** var. ***kaimontanum*** Seriz. – **Yamanashi**: Kitazawa (alt. 2000 m), K.Sasamura & T.Ohi-Toma SK581, SK582, SK583, SK584, SK585; Okanbasawa (alt. 1800–2100 m), K.Sasamura & T.Ohi-Toma SK587, SK588, SK589, SK590; Mt. Yanbushi (alt. 1900 m), K.Sasamura SK861, SK857, SK858, SK859, SK860, SK862, SK863, SK864, SK865, SK866, SK867, SK868, SK869, SK870.

Subsp. ***australe*** (M.Hotta) Seriz. – **Nara**: Mt. Odaigahara (alt. 1500–1600 m), K.Sasamura SK184; Mt. Misen (alt. 1500–1700 m), K.Sasamura SK198, SK192, SK199. **Shizuoka**: Mt. Amagi (alt. 1300–1400 m), K.Sasamura SK832.

Subsp. ***brevicollum*** (H.Ohashi & J.Murata) J.Murata – **Fukui**: Katsuyama (alt. 1400 m), K.Sasamura SK765, SK766. **Nagano**: Shimashimadani (alt. 1000 m), K.Sasamura SK074, SK075, SK076. **Niigata**: Mt. Amakazari (alt. 1700–1900 m), K.Sasamura & T.Ohi-Toma SK820, SK821, SK822.

Subsp. ***alpicola*** (Seriz.) J.Murata. – **Ishikawa**: Mt. Hakusan (alt. 1900–2000 m), K.Sasamura SK799, SK800, SK801, SK802.

笹村和幸[a]，邑田 仁[a]，大井・東馬哲雄[a,b]：**ヒロハテンナンショウ群とユモトマムシグサ群（サトイモ科テンナンショウ属）の倍数性**

テンナンショウ属 *Arisaema*（サトイモ科）の葉緑体DNA系統解析において姉妹群となる2つの単系統群，ヒロハテンナンショウ群 *A. ovale* group とユモトマムシグサ群 *A. nikoense* group について，それぞれの分布域から幅広く試料を収集し，染色体数を直接算定した二倍体の試料を基準とした相対ゲノムサイズ比較によって倍数性の推定を行うことで，倍数体の地理的広がりについて調べた．その結果，ヒロハテンナンショウ群ではヒロハテンナンショウ *A. ovale* Nakai に幅広い倍数性が認められ，従来知られていた二倍体 (2n=26) ～五倍体のほか，六倍体が青森県および北海道から発見された．これまで四倍体以上の倍数体の特徴と考えられていた地下茎上の副芽は六倍体でも認められた．また，二倍体は，従来静岡県だけから知られていたが，福島県および岩手県からも発見された．イナヒロハテンナンショウ *A. inaense* (Seriz.) Seriz. ex K.Sasamura & J.Murata とナギヒロハテンナンショウ *A. nagiense* T.Kobay., K.Sasamura & J.Murata は二倍体のみであった．一方，ユモトマムシグサ群では，二倍体 (2n=28) であることを確認したユモトマムシグサ *A. nikoense* Nakai を基準としてゲノムサイズを比較したところ，ユモトマムシグサ，ヤマナシテンナンショウ *A. nikoense* var. *kainumtanum* Seriz.、オオミネテンナンショウ *A. nikoense* subsp. *australe* (M.Hotta) Seriz.，カミコウチテンナンショウ *A. nikoense* subsp. *apicola* (Seriz.) J.Murata，ハリノキテンナンショウ *A. nikoense* subsp. *brevicollum* (H.Ohashi & J.Murata) J. Murataの全個体が二倍体レベルであり，ユモトマムシグサ群の多様化には倍数化が関与していないことが示された．

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