Zeitschrift: Veröffentlichungen des Geobotanischen Institutes der Eidg. Tech. Hochschule, Stiftung Rübel, in Zürich

Herausgeber: Geobotanisches Institut, Stiftung Rübel (Zürich)

Band: 100 (1988)

Artikel: Natürliche Bastardisierung zwischen weissblühenden "Ranunculus"-Arten in den Alpen = Natural hybridizations between white-flowered species of "Ranunculus" in the Alps

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Kapitel: Summary

DOI: https://doi.org/10.5169/seals-308908

R. aconitifolius L. s.l. mit *R. pyrenaeus* L. und mit *R. angustifolius* DC., mit *R. seguieri* Vill., mit *R. alpestris* L., mit *R. glacialis* L. und mit *R. gramineus* L. sowie *R. alpestris* L. x *R. glacialis* L. und *Callianthemum coriandrifolium* Rchb. x *R. glacialis* L. Nur die Kombination *R. aconitifolius* x *R. angustifolius* konnte im Experiment nachgewiesen werden; sie wurde jedoch in der Natur nicht gefunden.

4. Die Nomenklatur der Taxa wurde abgeklärt; Synonyme sind den korrekten Namen beigefügt (Kap. 5.1, 6.1, 7.1, 8.1). Fünf Bastardtaxa werden beschrieben:
   - *Ranunculus* x *intermediifolius* Huber, hybr. nov. (= *R. aconitifolius* L. x *R. platanifolius* L.)
   - *Ranunculus* x *scissus* Huber, hybr. nov. (= *R. kuepferi* Greuter & Burdet x *R. platanifolius* L.)
   - *Ranunculus* x *scissus* Huber nothosubsp. *disjunctus* Huber, nsubsp. nov. (= *R. kuepferi* Greuter & Burdet x *R. platanifolius* L.; 2n = 32, 40)
   - *Ranunculus* x *digeneus* Kerner ex Huber, hybr. nov. (= *R. parnassifolius* L. x *R. seguieri* Vill.)
   - *Ranunculus* x *digeneus* Kerner ex Huber nothosubsp. *latemarensis* Huber, nsubsp. nov. (= *R. parnassifolius* L. x *R. seguieri* Vill.; 2n = 40).

   Zusätzlich wurden zwei nomenklatorische Änderungen vorgenommen:
   - *Ranunculus* x *lacerus* Bell. nothosubsp. *valesiacus* (Suter) Huber, comb. et stat. nov. (= *R. kuepferi* Greuter & Burdet x *R. aconitifolius* L.; 2n = 40)
   - *Ranunculus kuepferi* Greuter & Burdet subsp. *orientalis* Huber, nom. nov.

SUMMARY

In the present work, the hybrid character of strange *Ranunculus*-taxa, controversial up to now, is demonstrated by means of extensive material.

1. As prerequisite for clarifying these hybrids the *Ranunculus aconitifolius* L. s.l. - complex was investigated in detail (chapter 5): It comprises two resembling species which were mostly not distinguished formerly, *R.*

aconitifolius L. s.str. and *R. platanifolius* L. Both species are diploid (2n = 16), sexual, and quite frequently hybridize, resulting in diploid progeny with reduced fertility.

2. The following astonishing hybrid combinations were investigated in detail:
   - *Ranunculus kuepferi* Greuter & Burdet x *R. aconitifolius* L. s.l. (chapter 6)
   - *Ranunculus kuepferi* Greuter & Burdet x *R. seguieri* Vill. (chapter 7)
   - *Ranunculus parnassifolius* L. x *R. seguieri* Vill. (chapter 8).

   a. The three combinations are surprising because the parents are extremely different in their morphological characteristics: *R. kuepferi* has narrowly lanceolate, entire leaves and is mostly 5-25 cm high, unbranched and 1flowered; *R. aconitifolius* s.l. has 5-7angular in outline, palmately divided leaves with entire or coarsely divided segments, is mostly 15-120 cm high and multiple branched; *R. seguieri*, also with 5-7angular in outline, palmately divided leaves but with finely divided segments, is only 3-15 cm high and 1-10flowered, whereas *R. parnassifolius* has ovally lanceolate or roundish but, like *R. kuepferi,* entire leaves and looks in other characteristics like this species too. The hybrids show various intermediate forms of leaves dependent on their ploidy level. The morphological characteristics of all parent and hybrid taxa are presented in the diagnoses (chapters 5.1, 6.1, 7.1, 8.1) as well as in a dichotomous key which includes other white flowered *Ranunculus* species (chapter 4).

   b. The phytosociological and ecological behaviour of the hybrids was compared with that of the parents by means of vegetation surveys, ecological indicator values, and observations at the habitat (chapters 5.2, 6.2, 7.2, 8.2).

   c. The astonishing hybrids occur in some natural localities. The geographical distribution of the taxa is given and pointed out in comparing maps (chapters 5.3, 6.3, 7.3, 8.3).

   d. Special attention was applied to the cytological investigations. The somatic chromosome number was determined for all parent species and hybrid combinations from numerous localities: While *R. aconitifolius* s.l. and *R. seguieri* are constantly diploid (2n = 16), *R. kuepferi, R. parnassifolius* and the various hybrids with these two species are found in several ploidy levels (2n = 16, 24, 32, 40); only the di-

ploid taxa are sexual, whereas the polyploid are apomictic (chapters 5.4, 6.4, 7.4, 8.4). The occurrence of the polyploid chromosome numbers coupled with apomictic reproduction is of particular interest and has decisive consequences to the morphology of the hybrids.
Aneuploid numbers were found in 4 plants (chapters 6.4, 7.4). Endomitoses were observed, too (chapter 3.2.2). Chromosome banding patterns proved to be unsuitable for taxonomy (chapter 3.2.3).

e. Pollen investigations (chapters 5.5, 6.5, 7.5, 8.5) and extensive pollination experiments (chapters 5.6, 6.6, 7.6, 8.6) showed that all hybrids studied have reduced fertility or were almost completely sterile. It was possible to produce experimentally several hybrid taxa corresponding to those existing in nature. The characterisation of progeny is still incomplete because the germination could not be accelerated, although various artificial methods were tried (chapter 3.5), and because the development of the juvenile plants usually takes several years.

3. The existence of some doubtful hybrids from literature was investigated and additional possibilities for hybridisation between white-flowered *Ranunculus* species were tested (chapter 9): crosses of *R. aconitifolius* L. s.l. with *R. pyrenaeus* L. and with *R. angustifolius* DC., with *R. seguieri* Vill., with *R. alpestris* L., with *R. glacialis* L. and with *R. gramineus* L. as well as *R. alpestris* L. x *R. glacialis* L. and *Callianthemum coriandrifolium* Rchb. x *R. glacialis* L. Only the combination *R. aconitifolius* x *R. angustifolius* was successfully accomplished; it was not found, however, in nature.

4. Nomenclature of the taxa was clarified; synonyms are added to the correct names (chapters 5.1, 6.1, 7.1, 8.1). Five hybrid taxa are described:
   - *Ranunculus* x *intermediifolius* Huber, hybr. nov. (= *R. aconitifolius* L. x *R. platanifolius* L.)
   - *Ranunculus* x *scissus* Huber, hybr. nov. (= *R. kuepferi* Greuter & Burdet x *R. platanifolius* L.)
   - *Ranunculus* x *scissus* Huber nothosubsp. *disjunctus* Huber, nsubsp. nov. (= *R. kuepferi* Greuter & Burdet x *R. platanifolius* L.; 2n = 32, 40)
   - *Ranunculus* x *digeneus* Kerner ex Huber, hybr. nov. (= *R. parnassifolius* L. x *R. seguieri* Vill.)
   - *Ranunculus* x *digeneus* Kerner ex Huber nothosubsp. *latemarensis* Huber, nsubsp. nov. (= *R. parnassifolius* L. x *R. seguieri* Vill.; 2n = 40).

In addition two nomenclatural changes were made:

- *Ranunculus* x *lacerus* Bell. nothosubsp. *valesiacus* (Suter) Huber, comb. et stat. nov. (= *R. kuepferi* Greuter & Burdet x *R. aconitifolius* L.; 2n = 40)
- *Ranunculus kuepferi* Greuter & Burdet subsp. *orientalis* Huber, nom. nov.

RESUME

Dans ce travail, l'origine hybride des renoncules énigmatiques et jusqu'à présent encore controversés est démontrée à l'aide d'un matériel important.

1. Une phase préalable à l'éclaircissement du problème de ces hybrides a été l'étude en détail du taxon collectif *Ranunculus aconitifolius* L. s.l. qui participe en tant que parent (chap. 5): il contient deux espèces proches qui autrefois n'étaient généralement pas distinguées: *R. aconitifolius* L. s. str. et *R. platanifolius* L. Les deux espèces sont diploïdes (2n = 16), sexuelles et forment assez souvent aussi entre elles des hybrides diploïdes à fertilité réduite.
2. Les combinaisons hybrides suivantes, présentées en détail, sont étonnantes:
   - *Ranunculus kuepferi* Greuter & Burdet x *R. aconitifolius* L. s.l. (chap. 6)
   - *Ranunculus kuepferi* Greuter & Burdet x *R. seguieri* Vill. (chap. 7)
   - *Ranunculus parnassifolius* L. x *R. seguieri* Vill. (chap. 8).

   a. Les trois combinaisons sont particulièrement surprenantes parce que les parents sont extrêmement contraires dans leurs caractères morphologiques: *R. kuepferi* a des feuilles étroitement lancéolées, entières, et a le plus souvent 5-25 cm de haut, une tige non ramifiée et 1 fleur; *R. aconitifolius* s.l. a des feuilles à 5-7 angles divisées radialement avec des segments non divisés ou divisés grossièrement, a le plus souvent une hauteur de 15-120 cm et est pluriramifié; *R. seguieri* a également des feuilles à 5-7 angles divisées radialement, mais avec des segments finement divisés, n'a que 3-15 cm de haut et 1-10 fleurs, tandis que *R. parnassifolius* a des feuilles elliptiquement lancéolées à arrondies, mais comme *R. kuepferi* entières et