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Chromosome numbers in some bryophytes from Wisconsin

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ABSTRACT. The paper presents the results of karyological study of some Wisconsin bryophytes. Chromosome numbers for five liverwort and twenty moss species are reported. The counts for *Porella platyphylloidea* (Schwein.) Lindb. (n = 8) and *Polytrichum pallidisetum* Funck (n = 14) are given here for the first time. New counts are reported for *Anomodon attenuatus* (Hedw.) Hueb. (n = 10) and *Atrichum undulatum* (Hedw.) P. Beauv. var. *oerstedianum* (C. Muell.) Crum (n = 7). *Bazzania trilobata* (L.) S. Gray (n = 9 + m), *Plagiochila asplenioides* (L.) Dum. (n = 8), *Neckera pennata* Hedw. (n = 10), and *Hylocomium splendens* (Hedw.) Schimp. (n = 11) have not been studied karyologically from North America.

KEY WORDS: Hepaticae, Musci, karyology, North America

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INTRODUCTION

In this paper the results of cytological study on Wisconsin bryophytes are presented. The many diverse habitats of Wisconsin provide various niches for common and rare (uncounted or rarely counted) bryophytes of which many occur at their extreme range limit (Crum & Anderson 1981). To our knowledge only a few species of bryophytes have been counted hitherto from Wisconsin and all are earlier than 1982 (see Fritsch 1991) whereas there are numerous chromosome data from other parts of the United States and Canada (Crum & Anderson 1981; Lin 1981; Finnen 1982; Ramsay 1983).

In this paper the chromosome numbers for 25 species of bryophytes belonging to 22 genera and 18 families are reported.

MATERIAL AND METHODS

The material for the present study was collected by the authors in 1984 chiefly from central Wisconsin. Apices of gametophytes or young capsules were fixed in acetic alcohol (3:1) and stained according to the acetic-haematoxylin method of Przywara and Kuta (1983). Voucher specimens are housed in the University of Wisconsin-Stevens Point Herbarium (UWSP). Locality data for the specimens studied are

presented in the Appendix. Nomenclature for mosses follows Anderson *et al.* (1990) and for hepatics, Stotler and Crandall-Stotler (1977).

OBSERVATIONS AND RESULTS

Hepaticae

Family: **Lepidoziaceae**

Bazzania trilobata (L.) S. Gray, n = 9 + m (Fig. 1)

None of *Bazzania* species have been studied cytologically from North America until now. Two different chromosome numbers were reported for *B. trilobata*: n = 9 + m for plants from France (Gagnieu & Lambert 1961) and n = 9 for Japanese populations (Inoue 1974). Recently both these counts have been found in Polish material. Fritsch (1983) established n = 9 + m for plants from northern Poland whereas Kuta & Ochyra (1988) counted n = 9 in the populations from the southern part of the country (the Pieniny Mts). *B. trilobata* has also been studied by Heitz (1927) who, however, did not establish a definite count and reported n = 9–10.

Two populations of *B. trilobata* have been examined and in both the chromosome number of n = 9 + m was found.

Family: **Conocephalaceae**

Conocephalum conicum (L.) Underw., n = 8 + m (Fig. 2)

This species has been studied cytologically several times in Europe, Asia and North America and four chromosome numbers were reported for *C. conicum*, viz.: n = 8; 8 + m; 9; 9 + m (Kumar & Anand 1984; Kuta *et al.* 1984, Inoue *et al.* 1985 – for all data see Fritsch 1991).

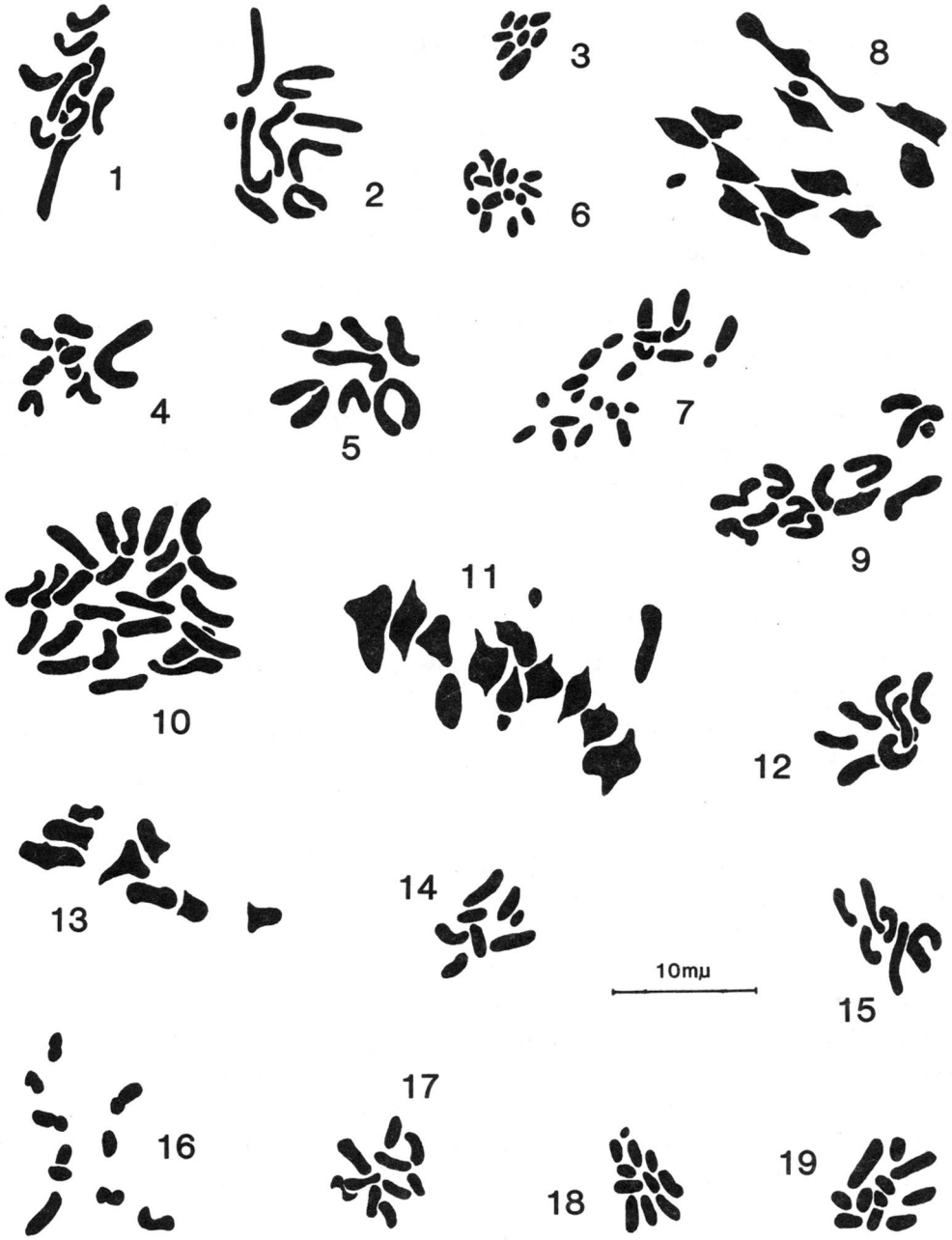
The present count of n = 8 + m confirms earlier cytological data for *C. conicum* from the United States (Showalter 1921a, b). Nomenclature of *C. conicum* accepted from Grolle (1983).

Family: **Frullaniaceae**

Frullania eboracensis Gott., n = 8 (Fig. 3)

Frullania eboracensis has been studied cytologically only by Iverson (1963). In her extensive cytological study she examined twelve populations of this species from Canada and the United States and discovered differences in chromosome number between male and female plants. The chromosome formula for female plants is n = 9, and for male plants n = 8.

In the present material from Wisconsin a count n = 8 was established. This suggests



Figs 1–19. Mitotic and meiotic metaphases of taxa examined. 1: *Bazzania trilobata* (L.) S. Gray, n = 9 + m. 2: *Conocephalum conicum* (L.) Underw. n = 8 + m. 3: *Frullania eboracensis* Gott., n = 8. 4: *Plagiochila asplenioides* (L.) Dum., n = 9. 5: *Porella platyphylloidea* (Schwein.) Lindb., n = 8. 6: *Schistidium apocarpum* (Hedw.) Bruch & Schimp., n = 14. 7: *Pohlia nutans* (Hedw.) Lindb., n = 22. 8–9: *Plagiomnium cuspidatum* (Hedw.) T. Kop., n = 12 + m and n = 12. 10–11: *P. medium* (Bruch & Schimp.) T. Kop., 2n = 24 and n = 12 + m. 12: *Rhizomnium punctatum* (Hedw.) T. Kop., n = 7. 13–14: *Bartramia pomiformis* Hedw., n = 8. 15: *Orthotrichum speciosum* Nees., n = 6. 16: *Neckera pennata* Hedw., n = 10. 17: *Anomodon attenuatus* (Hedw.) Hueb., n = 10. 18: *Anomodon minor* (Hedw.) Lindb., n = 10 + m. 19: *Thuidium erectum* Duby, n = 11.

that the plants examined were male. In the complement of *F. eboracensis* one chromosome was considerably larger.

Family: **Plagiochilaceae**

Plagiochila asplenioides (L.) Dum., n = 9 (Fig. 4)

This is apparently the first report of the chromosome number of *P. asplenioides* from North America. The haploid number n = 9 was determined on gametophytic mitoses in plants from Wisconsin. The chromosome complement consists of nine differently sized chromosomes of which one is conspicuously larger than the others. The same chromosome number n = 9 has been previously reported by three other authors (see Fritsch 1991), whereas some workers who have examined *P. asplenioides* cytologically reported the presence of m-chromosomes in the complement (Heitz 1927, 1928; Fritsch 1979, 1983; Kuta & Ochyra 1988).

Family: **Porellaceae**

Porella platyphylloidea (Schwein.) Lindb., n = 8 (Fig. 5)

No previous report of the chromosome number of this hepatic is known. The haploid number n = 8 was established on gametophytic mitoses. The present count is in agreement with most records for the genus *Porella*, most species investigated karyologically having n = 8 (Fritsch 1991).

Musci

Family: **Grimmiaceae**

Schistidium apocarpum (Hedw.) Bruch & Schimp., n = 14 (Fig. 6)

Karyologically *S. apocarpum* has been studied several times in Europe and North America. Four chromosome numbers: n = 12, 13, 14 and 26 have been found in this species (Fritsch 1991). Moreover Anderson (1980) discovered m-chromosomes in the complement of *S. apocarpum*. He reported the number n = 12 + m. In the present material a count of n = 14 has been established from mitoses in the young gametophytic apices.

Family: **Bryaceae**

Pohlia nutans (Hedw.) Lindb., n = 22 (Fig. 7)

Karyologically *P. nutans* is one of the most intensively studied moss. The haploid, polyploid, aneuploid as well as races with m-chromosomes have been reported from different parts of its geographical distribution. The haploid chromosome number n = 11

was found in the population from the Soviet Union (Fetisova & Vysotskaya 1970; Vysotskaya *et al*. 1983). The diploid (n = 22) and triploid (n = 33) cytotypes are the most frequently reported in *P. nutans* (Kuta *et al*. 1982; Vysotskaya & Lesnyak 1984; Fritsch 1985). A count of n = 20 was reported from Japan by Yano (1956) whereas Steere (1954) established the chromosome number n = 20 + m in plants from the Arctic. Recently surprising aneuploid series has been found in *P. nutans* by Fritsch (1987). In populations from eastern Germany he reported: n = 21 + m; *ca* 27; 32 + m and 31 + 2m.

The diploid chromosome number n = 22 has been determined in gametophytic mitoses in plants originating from Wisconsin.

Family: **Mniaceae**

Plagiomnium cuspidatum (Hedw.) T. Kop., n = 12 + m; n = 12 (Figs 8–9)

Both mitotic and meiotic chromosomes have been investigated. At meiotic metaphases twelve large bivalents and one small precociously dividing bivalent were observed. However, in somatic metaphases from young gametophytic apices only twelve large chromosomes were counted. No evidence of small chromosome equivalent to the small bivalent seen in meiosis could be found in any of several somatic cells examined. It is hard to explain what is the reason of the discrepancy between meiotic and mitotic counts. Possibly the small somatic chromosome do not stain or stains very slightly with the method employed so it cannot be discernible. Similar behaviour of m-chromosomes was reported in the other mosses. In *Sphagnum molle* Sull. Bryan (1955) found in meiotic metaphases 19 large bivalents plus two m-bivalents whereas in somatic tissues of the same species only 19 large chromosomes could be counted. Similarly Anderson and Crum (1958) found in *Ptilium crista-castrensis* (Hedw.) De Not. the chromosome number n = 10 + 1 in meiosis but in somatic divisions of sporogenous tissue they found only twenty large chromosomes in hundreds of somatic cells examined.

Plagiomnium cuspidatum has previously been studied several times and the haploid (n = 6) and diploid (n = 12) counts were invariably reported (see Fritsch 1991 for a detailed list).

Plagiomnium medium (Bruch & Schimp.) T. Kop., n = 12 + m; 2n = 24 (Figs 10–11)

Like in preceeding species both mitotic and meiotic chromosomes have been investigated. At meiotic metaphases apart from twelve large bivalents one conspicuously smaller bivalent could be observed, however in somatic divisions of sporogenous tissue only large chromosomes were seen. The somatic number 2n = 24 has been established.

Most workers who have examined *P. medium* found the diploid chromosome number n = 12 (see Fritsch 1991). Only Bowers (1969 and in Löve 1966) reported a haploid number n = 6 for this taxon but under different specific name as *P. trichomanes* (Mitt.) T. Kop. Later it was corrected by Koponen (1981) who determined Bowers' material as *P. medium*.

Rhizomnium punctatum (Hedw.) T. Kop., n = 7 (Fig. 12)

One Wisconsin population of *R. punctatum* has been studied and a haploid number n = 7 was established. This species has been examined cytologically several times from Asia, Europe and North America. The chromosome number n = 7 was reported most frequently (Fritsch 1991). In the complement of *R. punctatum* some workers observed m-chromosomes. The number n = 6 + m reported Heitz (1928), Hamant (1950), and Tatuno and Ono (1966). Recently Ochyra *et al.* (1985) established from sporophytic mitoses in plants from Poland the number 2n = 12 + 2m.

Family: **Bartramiaceae**

Bartramia pomiformis Hedw., n = 8 (Figs 13–14)

One population of *B. pomiformis* has been examined and a count of n = 8 was determined both on meiotic and mitotic metaphases. The chromosome complement consists of eight chromosomes of which one is considerably smaller. However, it was not small enough to be considered as an m-chromosome. The m-chromosomes have been previously reported in *B. pomiformis*. Heitz (1928) in the materials of unknown origin established the number n = 6 + m or 7 + m. In American populations Anderson (1980) found the count n = 7 + m, whereas Smith and Newton (1968) in British populations and Crum and Anderson (1981) in plants from North Carolina observed n = 8 + m chromosomes. Most workers who have examined *B. pomiformis* from various geographical regions reported the number n = 8 (for a detailed list see Fritsch 1991).

Family: **Orthotrichaceae**

Orthotrichum speciosum Nees., n = 6 (Fig. 15)

There are numerous chromosome data for this species mainly from the Soviet Union, North America and from Finland. Until now six different chromosome numbers have been reported for *O. speciosum*: n = 6, 7, 12, 12 + m, 13, and 18 (Danilkiv 1982; Fritsch 1982; Vysotskaya *et al.* 1983). During the course of the present study the haploid number n = 6 was determined in gametophytic mitoses of *O. speciosum*.

Family: **Neckeraceae**

Neckera pennata Hedw., n = 10 (Fig. 16)

Neckera pennata was studied until now only by L. N. Fetisova (in Lazarenko *et al.* 1971) from Latvia. She reported the number n = 10 from meiotic metaphases. The present count n = 10 established on mitoses in plants from Wisconsin confirms the previous data.

Only six species of the genus *Neckera* have been studied karyologically hitherto and four chromosome numbers have been reported: n = 8, 10, 11 and 12 (Javorčiková & Peciar 1986; Fritsch 1991).

Family: **Anomodontaceae**

Anomodon attenuatus (Hedw.) Hueb., n = 10 (Fig. 17)

There are only two reports dealing with chromosome data of *A. attenuatus*. Crum and Anderson (1981) determined n = 10 + m in plants from North America and recently Ochyra *et al.* (1985) found n = 11 in somatic metaphases of plants from southern Poland.

The chromosome number n = 10 established on mitoses from young gametophytic apices of three Wisconsin populations is the new count for *A. attenuatus*. Out of eight *Anomodon* species which have been examined cytologically hitherto the chromosome number n = 10 has been found, except *A. attenuatus*, only in *A. planatus* Mitt. and *A. viticulosus* (Hedw.) Hook. & Tayl. from India (Verma & Kumar 1981). The common number for all species of the genus *Anomodon* is n = 11.

Anomodon minor (Hedw.) Fuernr., n = 10 + m (Fig. 18)

Anomodon minor has been examined karyologically only by Crum and Anderson (1981) who found n = 10 + m in the materials from North Carolina. Recently Inoue (1984) and Pande and Chopra (cf. Fritsch 1991) reported the number n = 11 for a taxon described as *A. minor* subsp. *integerrimum* (Mitt.) Iwats. from Japan.

Ten normal size chromosomes plus one small chromosome designated as an m-chromosome have been observed in somatic metaphases from two Wisconsin populations of *A. minor*.

Family: **Thuidiaceae**

Thuidium erectum Duby, n = 11 (Fig. 19)

The present count of n = 11 obtained from two central Wisconsin populations confirms most previous cytological data for *T. erectum*. The same number has been reported by Anderson and Bryan (1958) for the materials from North Carolina, Smith and Newton (1968) for plants from Great Britain, Wigh (1972) for Scandinavian populations, Vysotskaya (1979) and Danilkiv (1982) for materials from the USSR, Javorčiková *et al.* (1988) for Czechoslovak plants and by Ochyra and Kuta (1990) for Polish materials. Another chromosome number for *T. erectum* was established by Crum and Anderson (1981) who reported n = 10 + m.

Family: **Brachytheciaceae**

Brachythecium oedipodium (Mitt.) Jaeg., n = 11 (Fig. 20)

The present chromosome count was based on gametophytic mitoses whereas all previously reported data have been established on meiotic figures. Two populations have been examined and the number of n = 11 was found. Four different chromosome numbers have been reported for *B. oedipodium*: n = 20 from Finland (Vaarama 1950) and from the Soviet Union (Danilkiv 1976, 1981; Vysotskaya 1985). On the other hand,

Ramsay and Schofield (1981) having examined Canadian populations found three chromosome races of this species: n = 7, 10 and 11. This taxon is better known under the familiar names such as *Brachythecium starkei* (Brid.) Schimp. var. *explanatum* (Brid.) Moenk., *B. starkei* subsp. *curtum* (Lindb.) Amann or *B. curtum* (Lindb.) C. Jens. but Piippo (1983) showed that the oldest available name for this taxon is *Brachythecium oedipodium* (Mitt.) Jaeg.

Family: **Hypnaceae**

Callicladium haldanianum (Grev.) Crum, n = 11 (Fig. 21)

Two chromosome numbers n = 11 and n = 22 have been reported for *C. haldanianum* (Fritsch 1991). During the present study the haploid number n = 11 was established on mitoses in plants from two Wisconsin populations. This is apparently a new count for North American materials. The diploid chromosome number n = 22 has been hitherto reported for this species for North America (Anderson and Bryan 1958; Crum & Anderson 1981; Lin 1981).

Family: **Hylocomiaceae**

Pleurozium schreberi (Brid.) Mitt., n = 5 (Fig. 22)

The chromosome number n = 5 was invariably detected for *P. schreberi*. The present study agrees with all previous chromosome data. The number n = 5 was established on the basis of gametophytic mitoses in three Wisconsin populations.

Karyologically *P. schreberi* is one of the most intensively investigated moss and the materials from Europe, Asia and North America have been examined (for a detailed data see Fritsch 1991).

Hylocomium splendens (Hedw.) Schimp., n = 11 (Fig. 23)

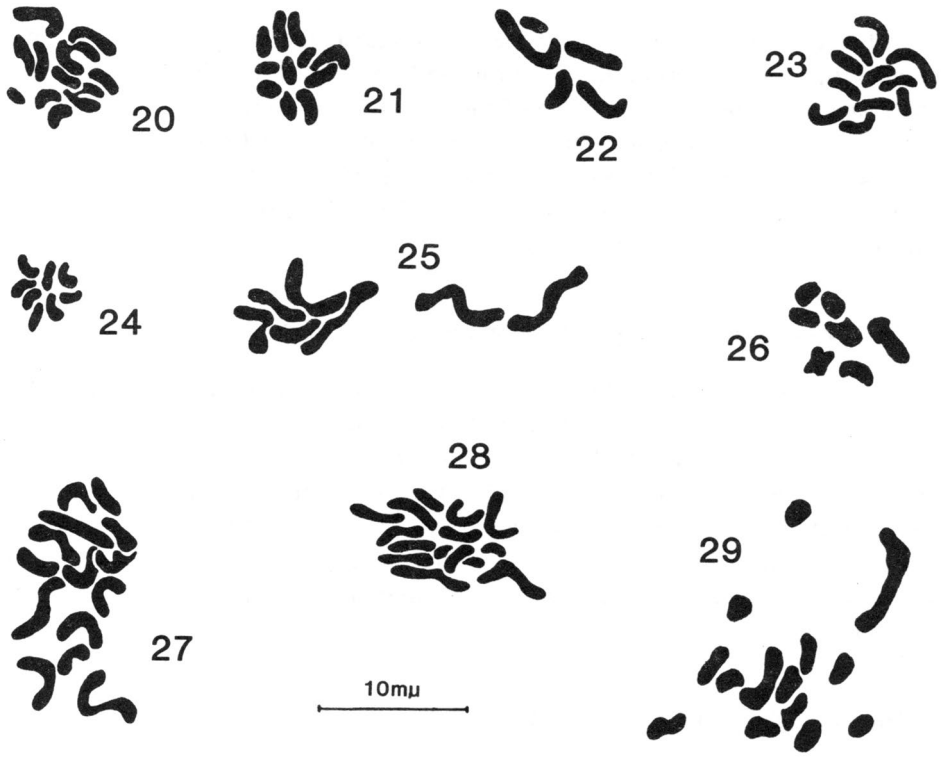
Three chromosome numbers have been reported hitherto for *H. splendens*: n = 10, 11, and 12 (Fritsch 1991). However, there are no chromosome data for this species from North America.

A single population of *H. splendens* from Wisconsin was studied and the number n = 11 was determined from gametophytic mitoses.

Family: **Tetraphidaceae**

Tetraphis pellucida Hedw., n = 8 (Fig. 24)

Tetraphis pellucida has been studied cytologically many times in Asia, Europe and in North America. Two chromosome numbers were reported for this species: n = 7 and n = 8 (Fritsch 1987, 1991). Both these counts were found in North America. Ireland (1967) established n = 7 in plants from Washington and Khanna (1964) reported n = 8



Figs 20–29. Mitotic and meiotic metaphases of examined taxa. 20: *Brachythecium oedipodium* (Mitten) Jaeg., n = 11. 21: *Callicladium haldanianum* (Grev.) Crum, n = 11. 22: *Pleurozium schreberi* (Brid.) Mitt., n = 5. 23: *Hylocomium splendens* (Hedw.) Schimp., n = 11. 24: *Tetraphis pellucide* Hedw., n = 8. 25: *Atrichum undulatum* (Hedw.) P. Beauv. var. *oerstadianum* (C. Muell.) Crum, n = 7. 26: *Polytrichastrum alpinum* (Hedw.) G. L. Smith, n = 7. 27: *Polytrichum piliferum* Hedw., 2n = 14. 28–29. *Polytrichum pallidisetum* Funck, n = 14.

from New York state. During the present study the number n = 8 was determined in somatic metaphases of plants from two Wisconsin populations of *T. pellucida*.

Family: **Polytrichaceae**

Atrichum undulatum (Hedw.) P. Beauv. var. ***oerstedianum*** (C. Muell.) Crum, n = 7 (Fig. 25)

For a long time *A. undulatum* has been subjected to cytological and cytotaxonomical investigations and there is a great deal of chromosome data from different parts of its wide geographical range (Abderrahman & Smith 1982, 1983; Newton 1983; Javorčiková & Peciar 1986; Javorčiková *et al.* 1988; Fritsch 1991). Three cytotypes: the haploid (n = 7), diploid (n = 14) and triploid (n = 21) have been reported for *A. undulatum*. The haploid chromosome number seems to be the rarest one whereas the triploid count was reported most frequently. In some geographical regions particular chromosome races differ morphologically and were recognized as separate taxa (like in Japan see Tatuno

1960), whereas in Great Britain they are indistinguishable morphologically (Smith & Newton 1966; 1968; Abderrahman & Smith 1982, 1983; Newton 1983).

The plants examined in the course of the present study have been determined as *A. undulatum* var. *oerstedianum*. This taxon has been previously studied karyologically from Canada by Inoue (1979) and by Crum and Anderson (1981) and the diploid number of n = 14 was found. The haploid count of n = 7 determined from mitoses in plants from Wisconsin is a new count for this taxon.

Polytrichastrum alpinum (Hedw.) G. L. Smith, n = 7 (Fig. 26)

Polytrichastrum alpinum has been examined karyologically by a number of workers in Europe, Asia, North America and the Antarctica and the haploid chromosome number n = 7 was reported (Kuta *et al.* 1982; Ochyra *et al*. 1985; Fritsch 1991). Only in *Polytrichastrum alpinum* var. *septentrionale* (Brid.) G. L. Smith and in populations named *Polytrichum alpinum* var. *brevifolium* (R. Brown) C. Muell. the diploid number n = 14 has been determined by Khanna (1967) and Lazarenko *et al.* (1971) respectively. The present count n = 7 was obtained from gametophytic mitoses in plants of one Wisconsin population.

Polytrichum piliferum Hedw., 2n = 14 (Fig. 27)

The diploid chromosome number 2n = 14 has been established from sporophytic mitoses and this is the first count for *P. piliferum* from the United States. During the present study plants from one Wisconsin population were examined.

There are numerous chromosome data concerning *P. piliferum* from Europe, Asia, Canada and the Antarctica region (Kuta *et al*. 1982; Fritsch 1991). Like in other *Polytrichum* species the haploid number n = 7 was most frequently reported for *P. piliferum*. Only Inoue (1979) established the diploid (n = 14) and triploid (n = 21) chromosome numbers in materials from Denmark and Sweden. Recently Fritsch (1987) has observed in the complement of plants originating from East Germany apart from seven normal chromosomes also a small accessory chromosome and gave the formula n = 7 + acc. The latter is especially interesting since genus *Polytrichum* seems to be very stable karyologically. The basic number x = 7 is rather unquestionable. No new aneuploid cytotypes or types with m-chromosomes have been reported till now in the genus. The old count n = 6 of Docters van Leeuwen-Reijnvaan (1908 cf. Fritsch 1991) is apparently incorrect.

Polytrichum pallidisetum Funck (Figs 28–29)

No previous report of the chromosomes of this species has been made. The plants from one Wisconsin population of *P. pallidisetum* were examined and the diploid number n = 14 has been established both on meiotic as well as mitotic metaphases. In the complement of this species two chromosomes are significantly larger however it was not possible to establish the localization of the centromeres in these chromosomes.

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APPENDIX

Details of Wisconsin specimens examined karyologically.

Bazzania trilobata (L.) S. Gray (1) Vernon Co., Wildcat Mountain State Park, Ref. No. 84/A/24. (2) Portage Co., Rosholt, Ref. No. 84/1.

Conocephalum conicum (L.) Underw. Vernon Co., Wildcat Mountain State Park, Ref. No. 84/A/43.

Frullania eboracensis Gott. Vernon Co., Wildcat Mountain State Park, Ref. No. 84/A/38.

Plagiochila asplenioides (L.) Dum. Marathon Co., Eau Claire Dells, Ref. No. 84/I.

Porella platyphylloidea (Schwein.) Lindb. Marathon Co., Eau Claire Dells, Ref. No. 84/IX.

Schistidium apocarpum (Hedw.) Bruch & Schimp. Marathon Co., Eau Claire Dells, Ref. No. 84/XI.

Pohlia nutans (Hedw.) Lindb. Vernon Co., Wildcat Mountain State Park, Ref. No. 84/A/1.

Plagiomnium cuspidatum (Hedw.) T. Kop. (1) Vernon Co., Wildcat Mountain State Park, Ref. No. 84/A/2. (2) Portage Co., Rosholt, Ref. No. 84/2.

Plagiomnium medium (Bruch & Schimp.) T. Kop. Vernon Co., Wildcat Mountain State Park, Ref. No. 84/A/44.

Rhizomnium punctatum (Hedw.) T. Kop. Vernon Co., Wildcat Mountain State Park, Ref. No. 84/A/42.

Bartramia pomiformis Hedw. Vernon Co., Wildcat Mountain State Park, Ref. No. 84/A/3.

Orthotrichum speciosum Nees. Marathon Co., Eau Claire Dells, Ref. No. 84/II.

Neckera pennata Hedw. Marathon Co., Eau Claire Dells, Ref. No. 84/IV.

Anomodon attenuatus (Hedw.) Hueb. (1) Marathon Co., Eau Claire Dells, Ref. No. 84/VIII. (2) Vernon Co., Wildcat Mountain State Park, Ref. No. 84/A/29. (3) Pine Hollow Scientific Area, Sauk Co., Ref. No. 84/9.

Anomodon minor (Hedw.) Lindb. (1) Vernon Co., Wildcat Mountain State Park, Ref. No. 84/A/5. (2) Marathon Co., Eau Claire Dells, Ref. No. 84/XIII.

Thuidium erectum Duby. (1) Vernon Co., Wildcat Mountain State Park, Ref. No. 84/A/4. (2) Portage Co., Rosholt, Ref. No. 84/3.

Brachythecium oedipodium (Mitt.) Jaeg. Portage Co., Rosholt, Ref. No. 84/4.

Callicladium haldanianum (Grev.) Crum (1) Portage Co., Rosholt, Ref. No. 84/5. (2) Marathon Co., Eau Claire Dells, Ref. No. 84/X.

Pleurozium schreberi (Brid.) Mitt. Portage Co., Rosholt, Ref. No. 84/7.

Hylocomium splendens (Hedw.) Schimp. Portage Co., Rosholt, Ref. No. 84/6.

Tetraphis pellucida Hedw. Vernon Co., Wildcat Mountain State Park, Ref. No. 84/A/6.

Atrichum undulatum (Hedw.) P. Beauv. var. *oerstadianum* (C. Muell.) Crum. Vernon Co., Wildcat Mountain State Park, Ref. No. 84/A/35.

Polytrichastrum alpinum (Hedw.) G. L. Smith. Vernon Co., Wildcat Mountain State Park, Ref. No. 84/A/7.

Polytrichum piliferum Hedw. Juneau Co., Ref. No. 84/8.

Polytrichum pallidisetum Funck. Vernon Co., Wildcat Mountain State Park, Ref. No. 84/A/48.

STRESZCZENIE

Praca przedstawia wyniki badań kariologicznych nad mszakami ze stanu Wisconsin w USA. Podane zostały liczby chromosomów dla pięciu gatunków wątrobowców oraz dwudziestu gatunków mchów. Po raz pierwszy ustalono liczby chromosomów dla *Porella platyphylloidea* (Schwein.) Lindb. (n = 8) i *Polytrichum pallidisetum* Funck (n = 14). Ponadto podano nowe liczby dla *Anomodon attenuatus* (Hedw.) MHueb. (n = 10) oraz *Atrichum undulatum* (Hedw.) P. Beauv. var. *oerstadianum* (C. Muell.) Crum (n = 7). Spośród przebadanych gatunków cztery nie były dotąd badane z obszaru Ameryki Północnej. Są to: *Bazzania trilobata* (L.) S. Gray (n = 9 + m), *Plagiochila asplenioides* (L.) Dum. (n = 8), *Neckera pennata* Hedw. (n = 10) oraz *Hylocomium splendens* (Hedw.) Schimp. (n = 11).