

PHYTOSOCIOLOGICAL STUDIES OF THE
HABITAT OF *ACHILLEA OCHROLEUCA* EHRH.
ON SZAMÁR-HEGY (VISEGRÁD MTS,
HUNGARY)

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Twenty phytosociological samples were taken on the habitat of *Achillea ochroleuca* Ehrh. in an andesite rocky grassland. The samples were analysed statistically according to the floral elements, life-forms, phytosociological characters, ecological parameters and social behaviour types of the species. The associations of the investigated habitat belong to the *Asplenio-Festucion pallentis* Zólyomi ass. group. With 7 tables and 1 figure.

Key words: *Achillea ochroleuca*, *Asplenio-Festucion pallentis*, phytosociology, andesite rocky grassland, Hungary

INTRODUCTION

Achillea ochroleuca Ehrh. is a characteristic species of sandy steppes. It occurs in large numbers in the open andesite rocky grasslands on the southern and western slopes of Szamár-hegy (Visegrád Mts), but it is absent from the very similar places of the Börzsöny and Mátra, and the other rocky grasslands of the Visegrád Mts. Ecological requirements of *Achillea ochroleuca* Ehrh. are: dry, loose, basic soil, open, sunny, undisturbed habitats. In this respect the rocky slopes of Szamár-hegy are similar to sandy steppes.

The bed-rocks of Szamár-hegy are andesite and andesite agglomerate. The southern and western sides of the mountain are covered by a mosaic of xerotherm oak forests, scrub forests and andesite rocky grasslands. The size of the grassland spots range from fifty to thousand square metres. These grassland spots are undoubtedly of natural origin, that is they have not been produced by human activity (e.g. deforestation). *Achillea ochroleuca* Ehrh. occurs usually in the open grassland spots on shallow soils where it forms polycormons.

The aim of this work was to study the structure of the vegetation supporting *Achillea ochroleuca* Ehrh. stands, and to determine the phytosociological status as well as the botanical value of these habitats.

METHODS

Sampling, classification and calculation of the values of the different variables were carried out according to DOBOLYI (1992). The only difference in the calculation is, that in this case one species can belong only into one category of the variables. The samples were analysed on the basis of the following characteristics of the species: floral element, Raunkiaer's life-form, phytosociological character (SIMON 1992), social behaviour type, degree of naturalness and ecological indicator values (BORHIDI 1993).

RESULTS

The relevés contained 92 vascular plant species altogether (Tables 1 and 2). Constant and subconstant species are the following: *Achillea ochroleuca*, *Festuca pseudodalmatica*, *Acinos arvensis*, *Alyssum alyssoides*, *Euphorbia cyparissias* and *Stachys recta*.

Concerning the floral element composition the Eurasian (incl. South Eurasian) elements are represented the most (Table 3). The exposure of the relevés ranges from South to West, therefore the microclimate of the investigated sites is relatively warm and dry. This fact explains the high proportion of Pontic, Mediterranean and Submediterranean elements. The high quantity of Pannonian and Carpathian elements show that rocky grasslands of the Hungarian Central Mountains are special habitats, and could be refugia for endemic and subendemic species.

The life-form distribution indicates the relatively high proportion of Therophytes and Chamaephytes (Table 4). These life-forms offer an adequate survival strategy for plants under extreme circumstances.

According to the phytosociological preference of the species, dry grassland elements and members of rocky grasslands (Festuco-Brometea, Festucetalia valesiaceae, Asplenio-Festucion and Festucion rupicolae) are predominating (Table 5). Based on the phytosociological analyses, the investigated habitat belongs to the Asplenio-Festucion pallentis Zólyomi association group, with some resemblance to the *Minuartio-Festucetum pseudodalmaticae* Klika and *Poetum pannonicae* Zólyomi communities. The considerable mass of Chenopodietea and Scalietaea elements indicates that degradation processes take place on that area.

The same conclusion can be drawn from the high quantity of weeds and ruderal competitors (Table 6). The presence of the natural pioneer species shows that open rocky grasslands – because of the rapid erosion – have a pioneer character. The relatively high proportion of specialists proves the high botanical value

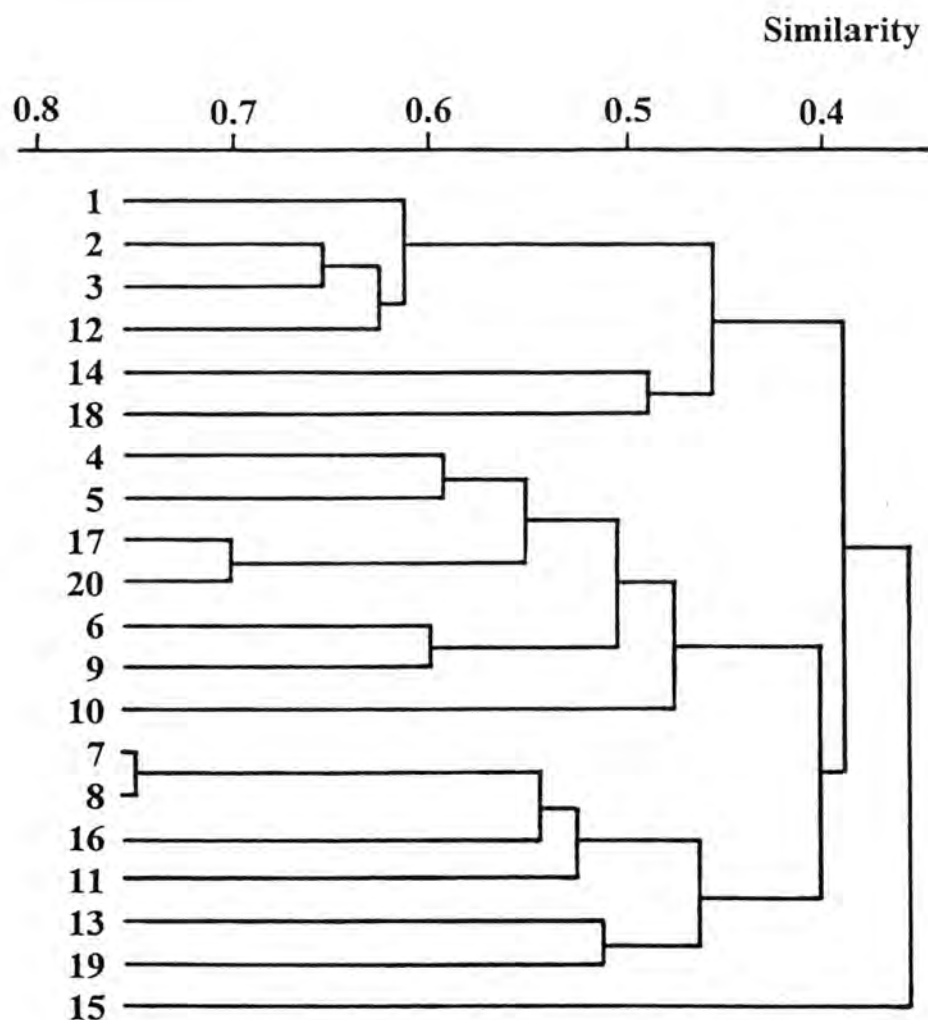


Fig. 1. Dendrogram of the relevés taken at the habitat of *Achillea ochroleuca*. The similarity matrix was calculated by the Czekanowski's function. The classification was performed by the SYN-TAX program package (PODANI 1988)

of this site. The average nature protection value (calculated according to BORHIDI 1993) is 3.46.

The distribution of the ecological indicator values correspond to the environmental circumstances: dry and warm microclimate, basic and nitrogen-poor soil. The extreme climatic character of these grasslands are also expressed by the ratio of species reflecting continentality (Table 7).

Table 1. The list of the species and their cover values in the relevés at the habitat of *Achillea ochroleuca*

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
<i>Achillea nobilis</i> L.	–	–	–	4	3	2	3	2	2	2	3	–	3	–	–	2	4	–	–	2
<i>Achillea ochroleuca</i> Ehrh.	5	6	7	2	3	2	5	3	3	1	1	6	3	4	3	2	5	4	1	5
<i>Achillea pannonica</i> Scheele	–	–	–	–	–	2	–	–	–	–	–	–	–	–	2	–	–	–	–	–
<i>Acinus arvensis</i> (Lam.) Dandy	–	1	2	2	2	1	1	–	2	2	1	1	–	1	1	2	–	–	2	2
<i>Agropyron repens</i> (L.) P. B.	2	2	–	1	–	2	–	–	–	–	–	–	2	–	2	–	–	–	2	–
<i>Allium flavum</i> L.	–	–	–	–	1	–	–	–	–	2	–	1	–	–	–	1	–	–	–	–
<i>Alyssum alyssoides</i> L.	2	–	1	3	2	1	1	2	3	1	1	1	–	2	2	–	1	3	–	1
<i>Anthemis tinctoria</i> L.	3	3	4	2	–	–	1	–	1	–	1	1	–	3	–	–	2	2	–	3
<i>Anthericum ramosum</i> L.	–	–	–	–	–	1	–	1	–	–	–	–	–	1	–	–	–	–	–	1
<i>Artemisia alba</i> Turra	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–
<i>Asperula cynanchica</i> L.	–	–	1	–	–	1	1	2	–	–	1	–	–	–	–	–	–	–	–	–
<i>Aster linosyris</i> (L.) Bernh.	–	–	–	–	–	–	–	–	–	4	–	–	–	2	–	–	2	3	–	3
<i>Bromus japonicus</i> Thunb.	3	1	–	3	2	1	–	–	1	1	–	3	3	–	–	–	3	–	2	–
<i>Cardaminopsis arenosa</i> Hay.	–	–	–	–	–	–	1	2	–	–	–	–	–	–	2	1	–	–	–	–
<i>Carduus collinus</i> W. et K.	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	2	–
<i>Carlina vulgaris</i> L.	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2
<i>Centaurea micranthos</i> Gmel.	4	1	2	–	–	–	2	3	–	1	1	1	–	–	–	1	–	–	1	–
<i>Cerasus mahaleb</i> (L.) Mill.	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–
<i>Chamaecytisus austriacus</i> Link	–	–	–	–	–	–	–	–	–	3	–	–	–	–	–	–	–	–	–	–
<i>Chondrilla juncea</i> L.	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–
<i>Cirsium vulgare</i> (Savi) Ten.	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–
<i>Convolvulus canthabrica</i> L.	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
<i>Crepis pulchra</i> L.	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
<i>Crupina vulgaris</i> Pers.	–	–	1	–	–	2	–	2	1	–	–	1	–	–	2	2	–	–	2	–
<i>Cytisus procumbens</i> Spreng.	–	–	–	–	–	3	–	–	3	–	–	–	–	–	–	–	–	–	2	–
<i>Dianthus pottederae</i> Kern.	1	–	1	1	–	2	–	–	–	–	2	–	–	–	1	–	1	–	–	–
<i>Digitalis grandiflora</i> Mill.	–	–	–	–	–	–	–	–	4	–	–	–	–	–	–	–	–	–	–	–
<i>Echium vulgare</i> L.	–	2	–	–	2	–	–	–	–	–	–	–	–	2	–	–	–	–	–	2
<i>Erophila verna</i> (L.) Chev.	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	1	–	–
<i>Eryngium campestre</i> L.	4	2	–	–	–	2	6	3	2	1	1	4	–	2	–	2	–	–	3	–
<i>Euphorbia cyparissias</i> L.	5	2	2	2	–	1	2	3	4	3	5	3	3	2	–	–	3	–	2	2
<i>Falcaria vulgaris</i> Bernh.	3	1	1	–	–	–	2	3	–	–	4	–	2	–	2	3	–	1	–	–
<i>Fallopia convolvulus</i> Löve	2	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
<i>Festuca pallens</i> Host	–	–	–	–	–	–	5	4	–	–	–	–	–	–	–	–	–	–	–	–

Table 1 (continued)

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
<i>Festuca pseudodalmatica</i> Kraj.	3	-	5	6	3	4	5	4	5	3	6	6	3	4	-	5	3	-	4	3
<i>Fragaria viridis</i> Duch.	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
<i>Galium aparine</i> L.	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Galium glaucum</i> L.	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
<i>Galium verum</i> L.	2	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
<i>Geranium columbinum</i> L.	2	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-
<i>Hieracium</i> sp.	-	-	-	-	-	-	-	-	3	4	-	-	-	-	-	-	-	-	-	-
<i>Holosteum umbellatum</i> L.	2	1	-	-	2	-	-	-	-	-	1	-	-	-	-	-	-	2	2	-
<i>Iris pumila</i> L.	-	-	-	-	-	1	2	2	-	-	-	-	-	-	-	-	-	-	3	-
<i>Koeleria cristata</i> (L.) Pers.	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2	-	-	3	-	2
<i>Lactuca perennis</i> L.	-	-	-	-	-	-	-	-	-	-	-	1	-	2	-	-	-	-	-	-
<i>Lanium amplexicaule</i> L.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-
<i>Lathyrus sphaericus</i> Retz.	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
<i>Linaria genistifolia</i> Mill.	-	-	-	-	-	-	-	-	-	1	-	-	-	-	2	1	-	-	-	-
<i>Lithospermum arvense</i> L.	-	-	-	-	2	1	-	-	-	-	-	1	-	-	-	2	2	-	-	-
<i>Medicago falcata</i> L.	-	-	3	-	3	6	-	-	-	-	-	2	-	-	-	-	-	-	2	-
<i>Medicago lupulina</i> L.	-	-	-	-	-	-	-	-	1	3	-	-	-	2	-	-	-	-	-	1
<i>Melica ciliata</i> L.	2	3	-	-	-	-	-	-	2	2	-	-	-	3	-	-	2	-	2	-
<i>Minuartia verna</i> (L.) Hiern.	-	-	-	-	-	2	3	-	1	-	-	-	-	-	-	-	-	-	-	-
<i>Muscari racemosum</i> (L.) Mill.	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-
<i>Myosotis ramosissima</i> Roch.	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-
<i>Onosma arenarium</i> W. et K.	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	2	-	-	-	-
<i>Papaver dubium</i> L.	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Papaver rhoeas</i> L.	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Poa pannonica</i> Kern.	-	-	2	-	2	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
<i>Potentilla arenaria</i> Borkh.	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	3	-	-
<i>Potentilla argentea</i> L.	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-
<i>Potentilla recta</i> L.	-	-	-	-	-	2	-	-	2	-	-	-	-	-	-	-	-	-	-	-
<i>Rosa canina</i> L.	2	-	-	-	2	-	-	2	-	1	1	-	-	-	-	-	-	-	-	-
<i>Salvia pratensis</i> L.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-
<i>Sanguisorba minor</i> Scop.	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-
<i>Scabiosa ochroleuca</i> L.	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
<i>Sedum acre</i> L.	-	-	-	2	2	1	1	2	1	3	-	-	-	-	-	-	-	1	-	-
<i>Sedum album</i> L.	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Sedum maximum</i> (L.) Hoffm.	-	-	1	-	-	-	2	2	-	-	-	1	-	-	-	-	-	-	-	-

Table 1 (continued)

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
<i>Sedum sexangulare</i> L.	-	-	-	2	-	1	-	-	-	3	-	-	-	-	-	-	-	2	-	-
<i>Seseli osseum</i> Cr. emend. Simk.	-	-	-	1	2	-	-	-	-	2	1	-	-	-	1	-	-	-	-	-
<i>Silene otites</i> (L.) Wibel	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Stachys recta</i> L.	3	3	3	2	2	1	1	-	3	1	-	3	-	-	2	-	2	1	-	3
<i>Stipa capillata</i> L.	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	2
<i>Stipa dasyphylla</i> Trautv.	-	-	-	-	3	4	2	3	2	-	-	-	-	-	-	-	-	-	-	-
<i>Stipa tirsia</i> Stev. emend. Celak	2	5	3	4	-	-	-	3	-	-	-	3	-	-	-	3	-	3	-	-
<i>Teucrium chamaedrys</i> L.	3	-	-	4	-	-	2	4	-	-	6	1	4	-	-	2	2	-	3	-
<i>Thesium linophyllum</i> L.	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Thymus glabrescens</i> Willd.	-	-	-	2	3	-	-	-	5	-	4	-	-	-	-	-	2	-	-	2
<i>Thymus pannonicus</i> All.	-	-	-	-	-	-	-	4	-	5	-	-	-	-	-	-	-	-	-	-
<i>Torilis japonica</i> (Houtt.) DC.	2	2	2	3	-	4	1	-	2	1	-	-	-	-	-	2	2	-	-	1
<i>Tragopogon dubius</i> Scop.	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
<i>Trifolium alpestre</i> L.	6	-	1	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-
<i>Trifolium arvense</i> L.	-	-	-	2	2	-	-	-	-	-	1	5	-	-	-	-	-	-	-	2
<i>Trifolium pratense</i> L.	-	2	-	3	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	2
<i>Ulmus minor</i> Mill.	-	4	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
<i>Valerianella pumila</i> DC.	5	2	1	-	-	3	2	-	3	1	-	-	-	-	1	-	2	-	-	2
<i>Verbascum phoeniceum</i> L.	-	-	-	-	-	-	2	-	-	-	-	-	-	2	-	-	-	-	-	-
<i>Veronica arvensis</i> L.	4	-	1	1	2	-	-	-	-	-	-	-	-	-	2	-	-	-	-	2
<i>Veronica spicata</i> L.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-
<i>Viola arvensis</i> Murr.	-	1	-	1	-	-	-	-	1	-	1	-	-	-	-	-	-	-	2	-
<i>Xeranthemum annuum</i> L.	6	4	1	5	2	-	-	-	-	-	-	3	-	2	-	-	-	-	3	2

Table 2. Additional data of the relevés

No	Date	Exposure	Angle of slope [°]
1	20.05.1994	S	30
2	20.05.1994	SW	40
3	20.05.1994	SW	40
4	20.05.1994	S	25
5	22.05.1994	SW	35
6	22.05.1994	SW	25
7	22.05.1994	SW	30
8	22.05.1994	SW	40
9	22.05.1994	SW	40
10	22.05.1994	SW	35
11	26.05.1994	S	30
12	26.05.1994	SW	40
13	26.05.1994	SW	35
14	26.05.1994	SW	30
15	26.05.1994	SW	25
16	02.06.1994	W	40
17	02.06.1994	W	30
18	02.06.1994	W	35
19	06.06.1994	SW	20
20	06.06.1994	SW	20

Table 3. The phytogeographical spectrum of the species co-occurring with *Achillea ochroleuca* (Ranking according to SIMON 1992)

Floral elements	Percentage [%]
Cosmopolitan	0.8
Circumpolar	2.1
Eurasian	27.3
South Eurasian	9.6
Continental	3.4
European	5.7
Central European	8.3
South-Eastern European	2.7
Mediterranean	3.9
Submediterranean	7.2
Balkan	0.4
Pontic	11.0
Pannonian	12.9
Carpathian	4.3
Alpine	0.4

Table 4. Raunkiaer's life form distribution of the species co-occurring with *Achillea ochroleuca*

Life form	Percentage [%]
Megaphanerophyte	1.0
Mesophanerophyte	0.9
Nanophanerophyte	1.1
Therophyte	27.4
Hemitherophyte	3.3
Hemicryptophyte	54.1
Chamaephyte	8.7
Geophyte	3.5

Table 6. Distribution of the social behaviour types of the species found in the habitat of *Achillea ochroleuca*. (According to BORHIDI's (1993) classification)

Social behaviour type	Percentage [%]
Specialists	11.4
Competitors	13.8
Generalists	27.6
Natural pioneers	15.7
Disturbance tolerants	23.6
Weeds	6.6
Ruderal competitors	1.3

Table 5. Distribution of the species in the habitat of *Achillea ochroleuca* according to their phytosociological character. (Classifications are based on SIMON 1992)

Phytosociological character	Percentage [%]
Molinio-Juncetea & Arrhenetheretea	0.8
Corynephoralia	1.2
Festucion vaginatae	7.7
Festuco-Brometea	28.4
Brometalia	0.8
Festucetalia valesiaceae	23.7
Festucetalia valesiaceae & vaginatae	3.4
Asplenio-Festucion	7.9
Festucion rupicolae	3.8
Danthonio-Stipion	2.6
Secalietea	1.3
Chenopodietea	7.9
Chenopodietea & Secalietea	3.1
Calystegieta	0.2
Querco-Fagetea	3.3
Quercetea pubescenti-petraeae	2.7
Quercetalia pubescentis	0.3
Ceraso-Quercetum pubescentis	0.1
Prunetalia	0.8

Table 7. Distribution of ecological indicator values (The classifications follow BORHIDI 1993. The WB scale ranges from 1 to 12)

	1	2	3	4	5	6	7	8	9
TB	–	–	–	–	18.6	30.7	34.1	16.0	0.6
WB	7.4	34.4	44.4	3.9	7.8	0.8	1.3	–	–
RB	–	–	–	1.2	9.8	13.8	21.4	52.0	1.8
NB	30.9	31.6	17.7	6.8	7.1	1.6	1.5	2.6	0.2
CB	–	–	14.4	20.5	15.0	20.1	17.6	12.4	–

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