Supplementary material for the paper entitled: "Diversity of *Mulgedio–Aconitetea* communities in the Sudetes Mts. (SW Poland) in the Central European context" by Świerkosz Krzysztof and Reczyńska Kamila

Supplementary material 2. A detailed description of the TWINSPAN analysis used to distinguish the associations described in the present paper

In order to detect the pattern in diversity of tall-herb communities we tested a number of unsupervised methods, both divisive and. We also used the K-means clustering methods of classification provided in JUICE (unsupervised and semi-supervised K-means). During the analyses we assumed that the lowest level of division should be between two strongly differentiated, but still in close spatial contact and floristically related phytocoenoses (e.g. of subalpine character). The results obtained, however, significantly differed depending on the method used. We obtained from 11 to 20 clusters at least some of which could not be phytosociologically identified at the rank of the association, presenting different variants distinguished by small and random groupings of species. On the other hand, in the case of K-means classification, we obtained results difficult to explain on the grounds of vegetation ecology. None of the methods used also yielded a clear solution for the division of groups using crispness of classification (Botta-Dukat et al. 2005).

Therefore, we had to start our analysis from the level of 18 clusters (Figure 1), because only at this division a group of relevés of the *Rumicetum alpini* (cluster 15) was visible.

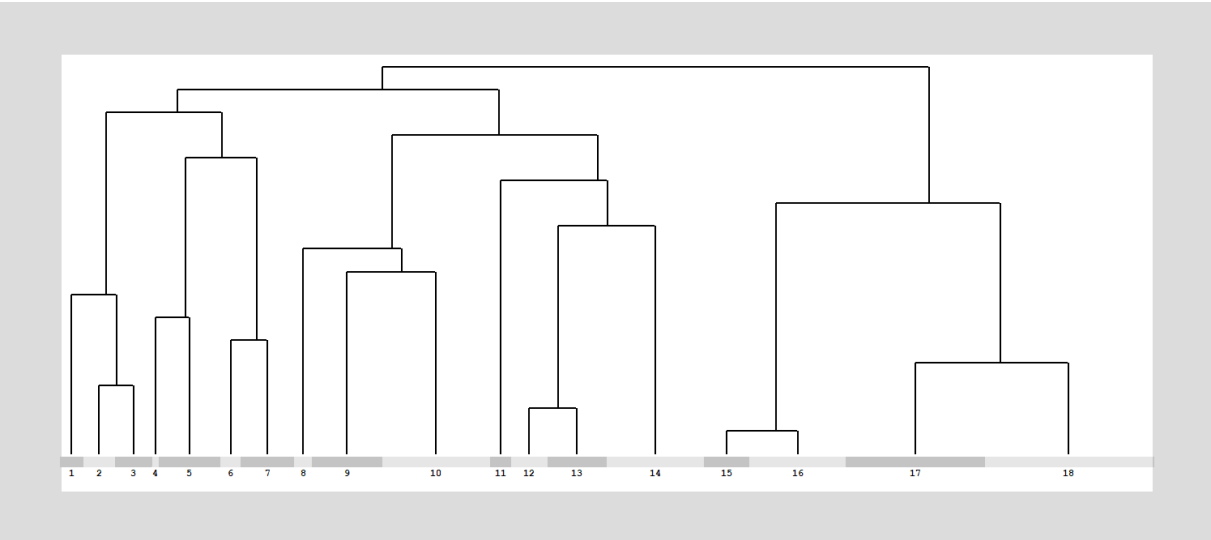

Figure1. The initial dendrogram and the assignment of individual clusters to associations or their forms.
1 - *Geranio phaei-Urticetum* (with high proportion of *Mercurialis perennis*); 2 - *Geranio phaei-Urticetum* (central); 3 - *Geranio phaei-Urticetum* (with high proportion of *Schedonorus giganteus*); 4 - *Petasitetum hybrydi*; 5 - *Petasitetum hybrydi* (with high proportion of *Phalaroides arundinacea*); 6 - *Petasitetum hybrydi* (central); 7 - *Petasitetum hybrydi* (with high proportion of *Geum rivale*); 8 - *Poo chaixii-Deschampsietum* (with 2 relevés of *Rumicetum alpini*); 9 - *Prenanthetum purpureae* (with high proportion of *Prenanthes purpurea*); 10 - *Prenanthetum purpureae* (with high proportion of *Lactuca alpina*); 11 - *Petasitetum hybrydi* with 3 relevés *Rumicetum alpini*; 12 - *Chaerophylo hirsuti-Petasitetum albi*; 13 - *Chaerophylo hirsuti-Petasitetum albi*; 14 - *Chaerophylo hirsuti-Petasitetum albi*; 15 - *Rumicetum alpini* (with 3 relevés of *Poo chaixii-Deschampsietum*); 16 - *Cicerbitetum alpinae*; 17 - *Athyrietum filicis-feminae*; 18 - *Crepido conyzifoliae-Calamagrostietum*.

Already at 17 clusters it merged with the neighboring cluster 16 representing *Cicerbitetum alpinae*. In general, the relevés from the Karkonosze Mts. formed one outstanding group, whereas the

relevés from lower altitudes, due to the participation of different accompanying species in particular patches, were divided into different groups within their clusters.

In the next step, in order to obtain a consistent associations, we manually merged clusters 1-3 (*Geranio phaei-Urticetum*), 4-7 and 11 (*Petasitetum hybrydi*), 9-10 (*Prenanthetum purpureae*), 12-14 (*Chaerophylo hirsuti-Petasitetum albi*). Clustres 8, 15, 16, 17 and 18 were left in their original positions, but it was necessary to transfer some of the single relevés – these were: relevés with a dominance of *Rumex alpinus* (2 relevés from cluster 8 and 3 relevés from cluster 11 were moved to cluster 15), then 3 relevés from cluster 15 (without presence of *Rumex alpinus* but with a dominance of *Deschampsia flexuosa*) were moved to cluster 8. This was the only way to obtain floristically and ecologically different groups, consistent with the results of field studies. In the last step, 16 relevés (4% of the total material) which had been erroneously assigned to clusters were moved to the groups wich better corresponded with their species composition especially in relation to domianant species.
Final clusters computed in PAST 4.0 using Ward's method and Euclidean similarity index showed close affinities of clusters 1-4, 5-6 and 7-9 (Figure 2).

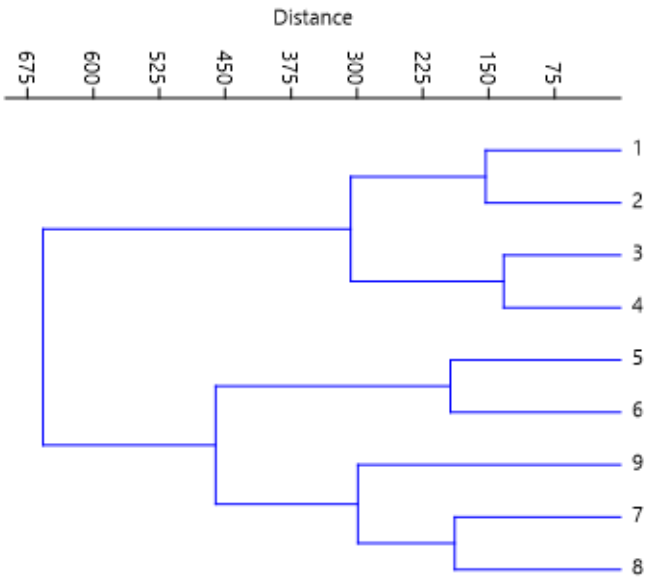

Figure2. Final clusters computed in PAST 4.0 using Ward's method and Euclidean similarity index
1 - *Geranio phaei-Urticetum* 2 - *Petasitetum hybrydi*; 3 - *Chaerophylo hirsuti-Petasitetum albi*, 4 *Prenanthetum purpureae*, 5 - *Rumicetum alpini*, 6 – *Poo chaixii-Deschampsietum*, 7 - *Crepido conyzifoliae-Calamagrostietum* 8 - *Athyrietum filicis-feminae*, 9 - *Cicerbitetum alpinae*

However, from the results of this analysis it is impossible to draw justified conclusions about the affiliation of particular communities to alliances and orders - and this was not the aim of this study. On the basis of the limited material we analyzed, we have no grounds to suggest e.g. combining the *Rumicetum alpini* and *Poo chaixii-Deschampsietum* into one group or excluding the latter from the alliance *Calamagrostion villosae*. Both associations have been described from a wide range in Central Europe and local differences in the set of diagnostic species resulted only from the material at our disposal. However, the proximity of clusters 1-4 gives reasons to suggest that they belong to one alliance.