

Some preliminary remarks to the synanthropic flora of villages and rural sites in Georgia (Caucasus)

Exkursionsnotizen zur ländlichen Ruderalflora von Georgien (Kaukasus)

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Abstract

Villages as well as other rural places in Georgia were studied in 2008 and 2019. Their synanthropic flora is rich in species and shows often also luxuriant abundance. Most villages in contact with mountain forests and subalpine pastures in the High Caucasus and in higher altitudes of the Lesser Caucasus are characterized by Artemisieta communities sometimes with large stands of some Apiaceae. They are quite similar to the alliances Arction and Onopordion. In contact with steppe vegetation, arid open woodlands and hemixerophytic scrublands thermophilous, xerophilous, and/or continental ruderal species became more frequent. In total some 270 species are recorded and documented.

Introduction

During two excursions in early summer 2008 and 2019 to Georgia we had also a chance to study the ruderal flora. The following notices give a first glimpse of the impressive variety and opulence of the ruderal vegetation of villages and pasture grounds. The aim is to document the actual state because it is to expect that the cattle breeding will change remarkably with direct consequences for the ruderal vegetation. Changes in land use and the increasing surface sealing within the settlements will alter the synanthropic vegetation too.

The relevant literature (RADDE 1899; NAKHUTSRISHVILI 2013; FISCHER, GRÖGER & LOBIN 2018) contains only rare information concerning the ruderal flora and vegetation. Only an excursion report of the botanical institute of the University of Innsbruck (ERSCHBAUMER & SCHÖNSWETTER 2012) takes ruderal habitats into account. Therefore my to some extent fragmentary notices should be published.

The taxonomy follows as far as possible FISCHER, GRÖGER & LOBIN (2018). The observations and remarks are structured according to the administrative regions of Georgia.

Kakheti

In Udabno (ca. 775 m a.s.l.), an isolated village at the national road Sh 172, the following ruderal stand growing on gravel of a broad earth band between the village street and a neighboring property was recorded:

Releve No. 4533, 8.6.2019, sample area 70 m², vegetation cover 70%:

3.3 *Cynodon dactylon*, 2.3 *Lolium perenne*, 2.3 *Sisymbrium irio*, 2.2 *Xanthium spinosum*, 2.2 *Hordeum murinum* subsp. *leporinum*, 1.2 *Marrubium vulgare*, 1.2 *Cardaria draba*, 1.2 *Leonurus quinquelobatus*, 1.2 *Salvia verbascofolia*, 1.2 *Bromus tectorum*, 1.2 *Lolium* cf. *multiflorum*, 1.1 *Onopordum acanthium*, 1.1 *Convolvulus arvensis*, 1.1 *Sisymbrium officinale*, 1.1 *Verbena officinalis*, + *Anthemis cotula*, + *Hirschfeldia incana*, + *Galium mollugo* agg., + *Capsella bursa-pastoris*.



Fig. 1: Udabno embedded in the steppe, note the trees within the village.



Fig. 2: *Polygonum alpestre* (= *P. cognatum*) in Udabno.

Furthermore the following species are amongst others part of the ruderal vegetation of Udabno:

Achillea biebersteinii, *Alcea rugosa*, *Ballota nigra*, *Bassia prostrata*, *Carduus* cf. *hamulosus*, *Carduus pycnocephalus*, *Carthamus lanatus*, *Centaurea iberica*, *Chenopodium album*, *Medicago caerulea*, *Melilotus officinalis*, *Lappula squarrosa*, *Onopordum acanthium*, *Polygonum alpestre*, *Sclerobloa dura*, *Torilis nodosa*, *Tragopogon* spec.



Fig. 3: *Onopordum acanthium* in Udabno.



Fig. 4: *Xanthium spinosum* in Udabno.



Fig. 5: *Lappula squarrosa* in Udabno.



Fig. 6: *Marrubium* cf. *vulgare*, *Cuscuta campestris*, *Hordeum murinum* subsp. *leporinum* in Udabno.

A steppe area intensively grazed by cattle at the national road Sh 172 at N 41 38 41.597 and E 45 21 36.864 (about 624 m a.s.l. and 6 km in the east of Sataple) showed the following interesting ruderal vegetation which may be part of the alliance Onopordion:

Achillea biebersteinii, *Anthemis cotula*, *Chenopodium vulvaria*, *Cuscuta campestris* (on *Marrubium vulgare*), *Cynodon dactylon*, *Echium vulgare*, *Echinops sphaerocephalus*, *Eryngium caeruleum*, *Eryngium campestre*, *Hordeum murinum* subsp. *leporinum*, *Hyocyamus niger*, *Malva neglecta*, *Marrubium vulgare*, *Petrorbagia cretica* (= *Fiedleria cretica*), *Polygonum alpestre* (= *Polygonum cognatum*), *Rumex crispus*, *Salvia nemorosa*, *Salvia verbasifolia*, *Sideritis montana*, *Silybum marianum*, *Thalictrum* cf. *simplex*, *Xanthium spinosum* (subdominant).



Fig. 7: Strongly overgrazed area with *Achillea biebersteinii*



Fig. 8: *Achillea biebersteinii*



Fig. 9: *Salvia verbasifolia* (in bud).



Fig. 10: *Eryngium caeruleum* (in bud).

Kvemo Kartli

It was obvious that most of the villages are more or less subdivided regularly. The structure of the buildings seems to originate back only to the 20th century, sometimes to the 19th century. At the montane altitude most of the properties are surrounded by orchards with walnut trees (*Juglans regia*) as the main fruit tree.

Sartichala is approx. 700 m a.s.l., it is one of the largest villages of Georgia. Nearby, the first German settlement in Georgia was established in 1818 by Swabian Germans, which were deported in the World War II by the Soviets to Central Asia and Siberia.



Fig. 11: Along the route S 5, running through Sartichala the typical green impression of Georgian villages, the small houses which are partly hidden by trees becomes apparent.

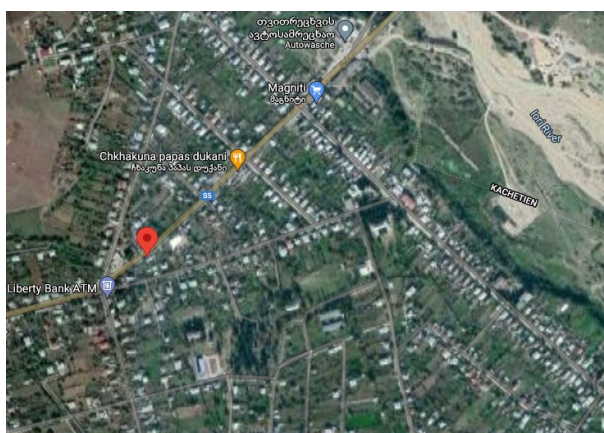


Fig. 12: Map section of Sartichala (GOOGLE maps, satellite): The big red dot marks the position where the picture (fig. 11) was taken.



Fig. 13: Orbeti (1314 m a.s.l.): the same situation 600 m higher.

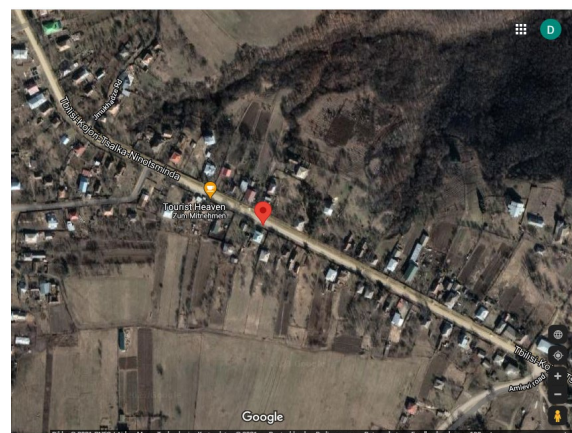


Fig. 14: The red dot marks the position of the photographer.

Sameba was founded by Greeks from the Pontus in 1830 m a.s.l., but most of the Greeks left after the collapse of the Sovjet Union. Along the main road we found:

Arctium lappa, *Artemisia absinthium*, *Artemisia vulgaris*, *Bunias orientalis*, *Carduus* spec., *Conium maculatum*, *Dactylis glomerata*, *Heracleum* spec., *Hesperis matronalis* subsp. *matronalis* (and subsp. *voronovii* ?), *Hyoscyamus niger*, *Onopordum acanthium*, *Scrophularia orientalis*, *Symphitum asperum*, *Thlaspi arvense*, *Urtica dioica*.



Fig. 15: Sameba, village in the Tsalka municipality (1510 m a.s.l.): note the silvery green stands of *Artemisia absinthium*.

Mtskheta-Mtianeti

Stepantsminda / Kasbegi is a market town at an altitude between 1700 m and 1800 m a.s.l. First of all the quarters climbing the slope to the east contain along the waysides ruderal plants to an extent not known from Central Europe. Low maintenance and migration from the land may force such a development. Amongst numerous grassland species the followings were noted:

Arctium spec., *Arenaria serpyllifolia*, *Artemisia absinthium*, *Artemisia vulgaris*, *Asperugo procumbens*, *Bunias orientalis*, *Capsella bursa-pastoris*, *Carduus* spec., *Cerastium arvense*, *Cirsium incanum*, *Chaerophyllum aureum*, *Chenopodium album*, *Cirsium echinus*, *Cruciata laevipes*, *Cynoglossum officinale*, *Descurainia sophia*, *Draba nemorosa*, *Fumaria schleicheri*, *Galium verum*, *Heracleum* spec., *Hordeum brevisubulatum*, *Hyoscyamus niger*, *Lactuca serriola*, *Lamium album*, *Leonurus quinquelobatus*, *Matricaria discoidea*, *Medicago lupulina*, *Myosotis alpestris*, *Nonea versicolor*, *Phedimus spurius*, *Plantago major*, *Polygonum alpestre*, *Polygonum aviculare* s. l., *Rumex* spec., *Silene multifida*, *Sisymbrium loeselii*, *Sisymbrium officinale*, *Stellaria media*, *Symphytum asperum*, *Thalictrum* spec., *Urtica dioica*.

Compared to 2008 *Bunias orientalis* covered larger parts within the grassland areas obviously less in use or even unused (land for future development) in 2019. As in Central Germany *Bunias orientalis* can be seen as an indicator of the changes in land use.



Fig. 16: *Bunias orientalis* in Stepantsminda.



Fig. 17: *Centaurea cheiranthifolia* in Stepantsminda.



Fig. 18: *Hyoscyamus niger* in Stepantsminda.



Fig. 19: *Asperugo procumbens* in Stepantsminda.

Very opulent ruderal stands are common in high-lying villages along the Georgian Military Road and in villages of the Lesser Caucasus. Such stands impress by species nowadays rare in Central Europe. The distinction between Sisymbrium- and Arction-communities seems to be impossible with such densely interlocked and homogenous looking communities.

Releve No. 4537: Stepantsminda, 12.6.2019, on building rubble, W 5°, sample area 40 m², vegetation cover 90 %:

3.3 *Hyoscyamus niger*, 3.2 *Asperugo procumbens*, 1.2 *Descurainia sophia*, + *Sisymbrium officinale*, +.2 *Chenopodium album*, +.2 *Stellaria media*, 3.4 *Urtica dioica*, 2.2 *Leonurus quinquelobatus*, 1.2 *Galium aparine*, 1.2 *Lamium album*, + *Artium spec.*, 1.2 *Polygonum aviculare* s. l., 1.1 *Polygonum alpinum*



Fig. 20: *Urtica dioica* in Stepantsminda.



Fig. 21: *Symphytum asperum* in Stepantsminda.



Fig. 22: *Lilium monadelphum*.



Fig. 23: *Vincetoxicum albanianum*.

Artemisia absinthium, *Hippophae rhamnoides* and *Juniperus sabina* show high appearance in the valley of the river Terek (Tergi) and in the Darial Canyon north of Stepantsminda. These species are also characteristic species of the inner alpine arid zones (see BRAUN-BLANQUET 1961) as well as for dry summer warm mountain regions of the Balkans (e.g. Albania). At the ruderalized borders of a parking area at 1575 m a.s.l. above the river Terek the following species were seen too:

Bromus inermis, *Bromus* aff. *tectorum*, *Cicerbita racemosa*, *Cirsium canum*, *Cirsium* spec., *Descurainia sophia*, *Echium vulgare*, *Lactuca serriola*, *Solanum persicum* (whose distinguishing characters compared with *S. dulcamara* are not clear, see TUTIN et al. 1972), *Urtica dioica*.



Fig. 24: *Hippophae rhamnoides* shrubbery.



Fig. 25: *Papaver fugax*.

At the Dariali Archangel monastery complex the high abundance of *Artemisia absinthium* was obvious too. About 2 km from the Russo-Georgian border at about 1340 m a.s.l. on a steep pasture above a creek *Artemisia absinthium* is associated with:

Arctium lappa, *Arenaria serpyllifolia*, *Bromus inermis*, *Capsella bursa-pastoris*, *Chenopodium album*, *Cirsium echinus*, *Echium vulgare*, *Geranium pyrenaicum*, *Hyoscyamus niger*, *Lactuca serriola*, *Lapsana communis* subsp.

grandiflora, *Melilotus officinalis*, *Poa annua*, *Securigera varia*, *Sisimbrium loeselii*, *Tanacetum parthenifolium*, *Turritis glabra*, *Urtica dioica*.

Under the half shade of *Pinus sylvestris* var. *hamata* impressive herbaceous perennial communities with *Astragalus galegiformis*, *Cicerbita petiolaris*, *Galega orientalis* and *Lilium* cf. *monadelphum* were noted.

We found in the Gveleti valley the following plants in the vicinity of damaged buildings, along the trail and at the banks of the stream:

Arctium lappa, *Artemisia absinthium*, *Artemisia splendens*, *Aruncus dioicus*, *Berberis vulgaris*, *Bunias orientalis*, *Cerastium arvense*, *Conium maculatum*, *Erysimum ibericum*, *Galega orientalis*, *Heracleum leskovii*, *Hesperis matronalis* subsp. *voronovii*, *Lamium album*, *Leonurus quinquelobatus*, *Linaria meyeri*, *Linum hypericifolium*, *Medicago glomerata*, *Papaver fugax*, *Rubus idaeus*, *Scrophularia divaricata*, *Sedum acre*, *Sisymbrium loeselii*, *Solanum persicum*, *Urtica dioica*.



Fig. 26: *Heracleum leskovii* and *Artemisia absinthium*.



Fig. 27: *Nonea versicolor*.

A trip to the small village Tsdo (ca. 1750 m a.s.l.) yielded some plants of more or less ruderal character and species often enriched at the wayside:

Alyssum alyssoides, *Arctium lappa*, *Artemisia absinthium*, *Artemisia splendens*, *Artemisia vulgaris*, *Bunias orientalis*, *Cerastium arvense*, *Chaerophyllum aureum*, *Cruciata laevipes*, *Epilobium angustifolium*, *Hippophae rhamnoides*, *Linum hypericifolium*, *Nonea versicolor*, *Pimpinella rhodantha*, *Rumex scutatus*, *Sobolenskyia caucasica*, *Tephrosia caucasigena*, *Trifolium alpestre*, *Urtica dioica*, *Valeriana alliariifolia*, *Verbascum* spp.



Fig. 28: View at the small village Tsdo.



Fig. 29: Graveyard above the Terek valley.

The monastery Zminda Sameba (Dreifaltigkeitskloster) is situated in a very picturesque situation at the top of the mountain Kvemi Mta (2170 m a.s.l.) in front of the mt. Kazbegi (5047 m a.s.l.) The church was probably built in the 14th century.



Fig. 30: The monastery Zminda Sameba.



Fig. 31: ...Its ruderalized slope.

The following species were found directly below the monastery on the steep slope (E and SE 40°-45°) which is both grazed and used as a small garbage dump:

Aiyyanthus pulcher, *Ajuga orientalis*, *Alchemilla* spec., *Androsace villosa*, *Antennaria caucasica*, *Artemisia absinthium*, *Artemisia splendens*, *Asperugo procumbens*, *Aster alpinus*, *Bistorta carnea*, *Campanula alpigena*, *Campanula tridentata*, *Cerastium arvense*, *Chamaesciadium acaule*, *Cirsium echinus*, *Cotoneaster integerrimus*, *Cynoglossum officinale*, *Dactylorhiza romana* subsp. *georgica*, *Daphne glomerata*, *Draba nemorosa*, *Fumaria* spec., *Galium aparine*, *Gentiana pyrenaica*, *Gymnadenia conopsea*, *Lamium album*, *Leonurus quinquelobatus*, *Marrubium* cf. *vulgare*, *Minuartia* spec., *Nardus stricta*, *Nepeta grandiflora*, *Nonea* cf. *versicolor*, *Plantago atrata*, *Plantago major*, *Pontechium maculatum*, *Primula algida*, *Pulsatilla albana*, *Taraxacum* spec., *Tragopogon reticulatus* (resp. *T. filifolius*?), *Urtica dioica*, *Valeriana alpestris*, *Verbascum* spec., *Viola arvensis*.

On the plateau below the monastery Zminda Sameba the short grass of which is presumably a substitute of *Betula pubescens* var. *litvinowii*-stands, which are well developed on some neighboring slopes, the regeneration started within small areas after being disrupted by removal of the sod.

Releve No. 4536, 12.6.2019, 2168 m a.s.l., sample area 1,5 m x 2 m, vegetation cover 20 %:
2.1 *Poa annua*, 1.2 *Plantago atrata*, 1.1 *Taraxacum* spec., 1.1 *Lolium perenne*, + *Veronica gentianoides*,
+ *Nardus stricta*, + *Betula pubescens* var. *litvinowii* (seedlings).

At a south-exposed slope along a farm road leading to stables located above the actual tree line (2180 m – 2230 m a. s. l.) the following species are found directly at the bank of the road:

Artemisia absinthium, *Achillea millefolium* s.l., *Bunias orientalis*, *Centaurea cheiranthifolia*, *Chamaesciadium acaule*, *Cirsium echinus* (subdominant), *Cynoglossum officinale*, *Galeopsis* cf. *bifida*, *Hyoscyamus niger*, *Mentha* cf. *longifolia*, *Nonea versicolor*, *Plantago major*, *Rumex alpinus*, *Tanacetum parthenifolium*, *Tussilago farfara*, *Urtica dioica*, *Verbascum* spec., *Veronica gentianoides*.

At the opposite absurd slopes the (sub)dominance of *Veratrum lobelianum* (= *Veratrum album* subsp. *lobelianum*) attracted attention. Obviously this species is disdained by the cattle and therefore indirectly promoted as pasture weed. FISCHER, GRÖGER & LOBIN (2018) mentioned however that the dried overground parts of *Veratrum lobelianum* are feed to animals. The reason may be that the content of alkaloids is lowering with increasing altitude.



Fig. 32: Farm road with tall ruderals.



Fig. 33: and *Chamaesciadium acaule*.



Fig. 34 and Fig. 35: Some examples of the difficult genus *Verbascum* (29 species in Georgia und probably some hybrids).



Fig. 36: The upper subalpine zone is mostly used as high pasture with lots of *Veratrum lobelianum* as pasture weed.

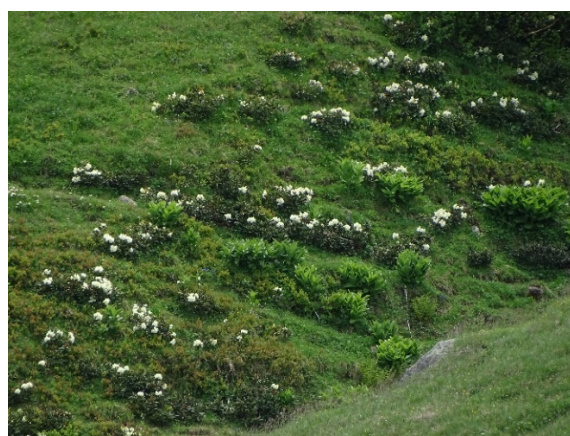


Fig. 37: Remnants of *Rhododendron caucasicum* and birch "Krummholz" (knee timber).

On ruderalized alluvions of the river Terek south of Stepantsminda near to the confluence of the river Sno the following species grow at about 1765 m a.s.l.:

Alyssum alyssoides, *Arenaria serpyllifolia*, *Artemisia absinthium*, *Asperugo procumbens*, *Astragalus* cf. *captiosus*, *Bunias orientalis*, *Chaenorhinum minus*, *Chenopodium foliosum*, *Cirsium erinus*, *Cynoglossum officinale*, *Descurainia sophia*, *Echium vulgare*, *Erucastrum gallicum*, *Lappularia squarrosa*, *Lamium album*, *Matricaria discoidea*, *Papaver fugax*, *Petrorhagia saxifraga*, *Senecio vulgaris*, *Sisymbrium loeselii*, *Sisymbrium officinale*, *Tanacetum spec.*, *Triticum aestivum*, *Tussilago farfara*, *Verbascum* spp., *Ziziphora puschkini*.



Fig. 38: Lots of *Verbascum* spp. on the gravel of the river Terek.



Fig. 39: *Chenopodium foliosum* (left) on the gravel of the river Terek.

Within the loosely settled village Sno as well as at the base of the watch tower we found:

Arctium lappa, *Artemisia vulgaris*, *Bunias orientalis*, *Capsella bursa-pastoris*, *Conium maculatum*, *Cynoglossum officinale*, *Descurainia sophia*, *Lamium album*, *Lappula squarrosa*, *Marrubium* cf. *vulgare*, *Medicago lupulina*, *Melilotus albus*, *Nepeta cataria*, *Nepeta* cf. *grandiflora*, *Oxytropis albana*, *Papaver fugax*, *Petasites hybridus*, *Phedimus spurius*, *Pimpinella rhodantha*, *Plantago lanceolata*, *Polygonum aviculare* s.l., *Rumex spec.*, *Scrophularia* cf. *cinerascens*, *Sedum acre*, *Sobolewska caucasica*, *Urtica dioica*, *Verbascum* aff. *floccosum*, *Verbascum* cf. *laxum*.



Fig. 40: Watchtower in Sno (1780 m a.s.l.).



Fig. 41: Ruderal vegetation in Sno (1780 m a.s.l.).



Fig. 42: *Tanacetum parthenifolium* in Sno (1780 m a.s.l.).



Fig. 43: Small and partially abandoned village Akhaltsikhe (1780 m a.s.l.).

Within the mountain village Dshuta (about 2100 m a.s.l.) located at the end of the Sno valley the scattered farms are surrounded by tall forb communities. The following ruderal species were noted:

Artemisia vulgaris, *Asperugo procumbens*, *Barbarea vulgaris*, *Bunias orientalis*, *Capsella bursa-pastoris*, *Carduus spec.*, *Cerastium hemschianicum*, *Chaerophyllum aureum*, *Chaerophyllum cf. roseum*, *Cynoglossum officinale*, *Descurainia sophia*, *Epilobium angustifolium*, *Galium aparine*, *Heracleum spp.*, *Hesperis matronalis*, *Hyoscyamus niger*, *Lamium album*, *Medicago lupulina*, *Myosotis alpestris*, *Nonea versicolor*, *Polygonum aviculare*, *Rumex alpinus*, *Sedum cf. hispanicum*, *Symphytum asperum*, *Thlaspi arvense*, *Urtica dioica*, *Verbascum cf. pyramidatum*, *Veronica gentianoides*.



Fig. 44: The village Dshuta (ca. 2100 m a.s.l.).



Fig. 45: A farm at the upper part of Dshuta.



Fig. 46: *Cerastium hemschianicum* in Dshuta near the creek.



Fig. 47: *Hesperis matronalis* in tall forb communities.

At the Jvari Pass (2397 m a.s.l.) it was possible to study high-altitude pastures and? the anticlinal folds of which are intensively used by cattle.



Fig. 48: Vegetation change caused by intensive breeding: dominance of *Rumex alpinus*.



Fig. 49: Young shoots of *Veratrum lobelianum*.

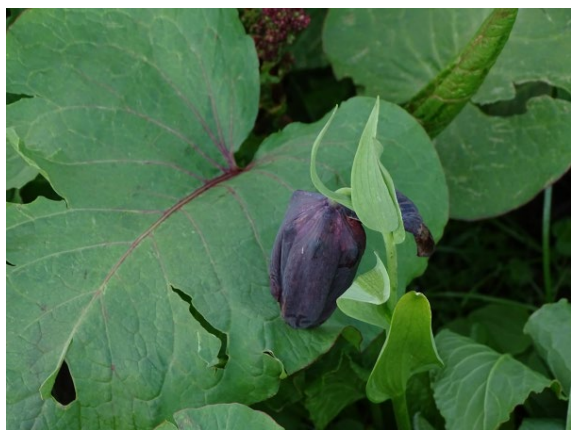


Fig. 50: *Fritillaria latifolia* in front of a large leaf of *Rumex alpinus*.



Fig. 51: *Veronica filiformis*.

Such a cattle breeding leads to the same vegetation changes as are known from the surrounding of alpine huts (Almen) in the Alps. *Gagea* spec., *Fritillaria latifolia* and *Veratrum lobelianum*, with low species magnitude *Urtica dioica*, *Alchemilla* spec., *Galanthus platyphyllos* and *Veronica filiformis* are found within the dense matrix of *Rumex alpinus* on the pastures. *Veronica filiformis* was introduced to Central Europe as an ornamental plant and is meanwhile established as a neophyte. Already in 1920 this running wild was seen in Southern Bavaria. According to MÜLLER (1988) *Veronica filiformis* differentiates lawns in rainy and subatlantic areas. The pastures of the Jvari Pass are furrowed by numerous small creeks at the borders of which *Trollius ranunculinus* and *Caltha palustris* (syn. *C. polypetala* ?) are growing during early summer.

Gudauri (about 2196 m a.s.l.) is a small but continuously growing winter sports center with single hotels, ski lifts, sub-alpine fallow land while loosely settled. The prospective building land is characterized by large stands of *Rhododendron luteum*, subalpine meadows and ruderalized sites. We found:

Ajuga genevensis, *Ajuga orientalis*, *Astragalus* cf. *captiosus*, *Betula pubescens* var. *litwinowii*, *Bunias orientalis*, *Cicerbita racemosa*, *Cirsium canum*, *Cirsium vulgare*, *Cruciata laevipes*, *Cynoglossum officinale*, *Dactylorhiza euxina* var. *euxina*, *Dactylis glomerata*, *Echium vulgare*, *Euphorbia glaberrima*, *Geranium pyrenaicum*, *Heracleum* spec., *Hesperis matronalis*, *Lappula squarrosa*, *Lotus corniculatus*, *Papaver fugax*, *Plantago lanceolata*, *Plantago major*, *Poa annua*, *Polygala* cf. *alpicola*, *Rumex alpinus*, *Sambucus ebulus*, *Taraxacum officinale* agg., *Teucrium polium*, *Tussilago farfara* (at cracked loamy slopes, after hurting the sod of embankments and on earth deposits), *Urtica dioica*, *Veratrum lobelianum*, *Veronica filiformis*.

Many villages in the steep valleys of the Greater Caucasus are endangered by mudslides and undercut slopes. Such situations can be seen for example in the valley of the river Aragvi from the Georgian Military Road (fig. 52).



Fig. 52: Zemo Mleta (ca. 1540 m a.s.l.) with an unstable and very steep slope above the river Aragvi.



Fig. 53: Kvemo Mleta (ca. 1475 a.s.l. m) after heavy mudslides.

The fortress Ananuri is situated above the northwestern arm of the Aragvi reservoir on an altitude of about 860 m a.s.l. Often contested the fortress contains two churches, a bell tower, a defense tower and further buildings built up in the 17th century. Within the fortress the following species were found:

Alcea rugosa, *Arctium lappa*, *Asplenium ruta-muraria*, *Bunias orientalis*, *Campanula sibirica* subsp. *hobenackeri*, *Chelidonium majus*, *Convolvulus arvensis*, *Cornus* cf. *sanguinea* subsp. *australis*, *Corylus avellana*, *Cuscuta europaea*, *Cynoglossum officinale*, *Dactylis glomerata*, *Echium vulgare*, *Eryngium campestre*, *Galium album* s.l., *Geranium pyrenaicum*, *Hypericum perforatum*, *Juglans regia* juv., *Lamium album*, *Lappaula squarrosa*, *Leonurus quinquelobatus*, *Lolium perenne*, *Malva neglecta*, *Onobrychis albana*, *Onopordum acanthium*, *Plantago major*, *Poa nemoralis*, *Reseda lutea*, *Salvia nemorosa*, *Sambucus ebulus*, *Stellaria media*, *Symphytum asperum*, *Tanacetum parthenifolium*, *Tussilago farfara*, *Urtica dioica*.

Within the nearby village Zhinvali (700 – 750 m a.s.l.) the following species were noted along the main road:

Acer negundo juv., *Ailanthus altissima*, *Armoracia rusticana*, *Bromus* aff. *sterilis*, *Cardaria draba* (eudominant), *Carthamus lanatus*, *Centaurea iberica* (eudominant), *Cirsium inanum*, *Convolvulus arvensis*, *Dactylis glomerata*, *Echium italicum* subsp. *biebersteinii*, *Echium vulgare*, *Hordeum murinum* subsp. *leporinum*, *Humulus lupulus*, *Malva neglecta*, *Onopordum acanthium*, *Robinia pseudoacacia* juv.

In the growing areas of Caucasian Oriental beech forests and Oriental hornbeam-oak forests we often found *Sambucus ebulus*, mostly at forest edges in the proximity of villages:

Releve No. 4535: *Sambucetum ebuli* nearby Tskhvarichamia (Saguramo Range), 1130 m a.s.l., 10.6.2019, sample area 60 m², vegetation cover 100 %:
4.4 *Sambucus ebulus*, 2.3 *Rubus fruticosus* agg. (very similar to *Rubus armeniacus*), 2.2 *Urtica dioica*, 1.2 *Cirsium incanum*, 1.1 *Clematis vitalba*, 1.1 *Poa trivialis*, + *Geranium robertianum*, + *Trifolium pratense*.



Fig. 54: Cattle on the road in Zhinvali.



Fig. 55: *Sambucus ebulus* and *Rubus fruticosus* agg. in Tskhvarichamia.

Jvari monastery, a sixth century monastery complex situated on the rocky mountain top (630 m a.s.l.) at the confluence of the Kura (Mtkvari) river and the Aragvi river, overlooking the town of Mtskheta (formerly the capital of the kingdom of Iberia). During visits in 2008 and 2019 we found the following thermophilous species as reference to the favourable climate of this place:

Achillea biebersteinii, *Achillea filipendulina*, *Agropyron pectinatum* [according to ERSCHBAMER & SCHÖNSWETTER 2012], *Alcea rugosa*, *Anchusa azurea*, *Artemisia chamaemelifolia* [according to FISCHER, GRÖGER & LOBIN (2018), whilst ERSCHBAMER & SCHÖNSWETTER (2012) found *A. lerchiana*], *Capsella bursa-pastoris*, *Carduus acanthoides*, *Celtis caucasica*, *Centaurea solstitialis*, *Convolvulus arvensis*, *Cynodon dactylon*, *Descurainia sophia*, *Dianthus orientalis*, *Echium italicum* subsp. *biebersteinii*, *Ephedra procera*, *Galium verum*, *Hordeum murinum* subsp. *leporinum*, *Hyoscyamus niger*, *Lactuca serriola*, *Linum austriacum*, *Lolium perenne*, *Malva sylvestris*, *Medicago caerulea*, *Onobrychis radiata*, *Paliurus spina-christi*, *Plantago major*, *Polygonum alpestre*, *Rapistrum rugosum*, *Salvia nemorosa*, *Sclerochloa dura*, *Scrophularia* cf. *olympica*, *Silybum marianum*, *Sisymbrium irio*, *Sisymbrium loeselii*, *Teucrium polium*, *Trifolium angustifolium*, *Verbena officinalis*, *Zygophyllum fabago*.



Fig. 56: *Salvia nemorosa* and *Malva sylvestris*.



Fig. 57: *Artemisia chamaemelifolia*.



Fig. 58: *Ononis striata*.



Fig. 59: *Zygophyllum fabago*.



Fig. 60: *Centaurea solstitialis*.



Fig. 61: *Centaurea reflexa*.



Fig. 62: *Consolida divaricata*.



Fig. 63: *Trifolium angustifolium*



Fig. 64: *Sclerochloa dura* (herbarium specimen and trampled vegetation).



Fig. 65: *Alcea rugosa*.

SAMTSKHE -JAVAKHETI

Just below Bakuriani there is a highly interesting dry slope already visited by several excursions (s. ERSCHBAMER & SCHÖNSWETTER 2012). Its vegetation is dominated by *Astragalus microcephalus*, besides numerous dry grassland species some ruderal plants are found:

Acinos arvensis, *Allium atroviolaceum*, *Asperula glomerata*, *Asperula orientalis*, *Bromus japonicus*, *Carduus* cf. *bohenackeri*, *Centranthus longifolius*, *Cleome iberica*, *Coluteocarpus vesicaria*, *Convolvulus cantabrica*, *Cynoglossum officinale*, *Echium vulgare*, *Euphorbia pontica*, *Galium verum*, *Gypsophila elegans*, *Herniaria incana*, *Hyssopus officinalis* var. *angustifolius*, *Linaria genistifolia*, *Medicago minima*, *Nepeta mussinii*, *Onosma caucasica*, *Papaver fugax*, *Petrorhagia saxifraga*, *Plantago lanceolata*, *Poa bulbosa*, *Rhaponticum pulchrum*, *Sanguisorba minor* cf. subsp. *balearica*, *Scrophularia variegata*, *Scutellaria orientalis* subsp. *orientalis*, *Securigera veria*, *Sedum* spec. (petals white, pentamerous), *Silene chlorifolia*, *Sisymbrium officinale*, *Stachys aetherocalyx*, *Telephium imperati* subsp. *orientale*, *Teucrium orientale*, *Teucrium polium*, *Thesium ramosum*, *Trifolium arvense*, *Verbascum* spec., *Veronica livanensis*.

Bakuriani (about 1700 m a.s.l.) is on an accelerated transformation process to an international well known touristic place in Georgia.



Fig. 66: Rural situation in Bakuriani (2008).



Fig. 67: Cattle drive in Bakuriani (2008).

Whilst in 2008 every day small droves came through the village, in 2019 at least numerous *Artemisia* species indicate the (former?) animal breeding:

Arctium lappa, *Bunias orientalis*, *Cardaria draba*, *Cephalanthera gigantea*, *Chaerophyllum aureum*, *Cynoglossum officinale*, *Dactylis glomerata*, *Echium vulgare*, *Geranium pyrenaicum*, *Hesperis matronalis*, *Lamium album*, *Leonurus quinquelobatus*, *Matricaria discoidea*, *Plantago major*, *Rumex alpinus*, *Rumex spec.*, *Sambucus ebulus*, *Sisymbrium loeselii*, *Symphytum asperum*, *Tussilago farfara*, *Urtica dioica*, *Verbascum spec.*

The Armenian village Tabatskuri (ca. 2000 m a.s.l.) is situated above the tree line which at this place is lowered by anthropogeneous influence. Only a reforested wood at the border of the lake indicate that trees are able to grow here. The farming aims obviously to own needs. In 2019 horses were still used for ploughing. The catastrophic lack of fuel is partly counteracted by dry dung. Thereby the nutrients are not going back to the fields and grasslands leading to emaciation. This may increase the phytodiversity of the grassland. The formation of big dung bricks and their drying was also seen in villages lying above the tree line at the Paravani lake. A similar use of the dung was seen in Armenian villages at the Sevan lake. Furthermore an equal use exists in arid regions of Inner Asia. According to internet information the livelihood of Tabatskuri was based on fishing in the past, but now this seems no longer possible due to change in ownership.

Species recorded for Tabatskuriani are:

Arctium lappa, *Artemisia absinthium*, *Cephalaria gigantea*, *Cirsium incanum*, *Hesperis matronalis*, *Hyoscyamus niger*, *Leonurus quinquelobatus*, *Rumex alpinus*, *Sisymbrium loeselii*, *Symphytum asperum*, *Trifolium repens*, *Urtica dioica*



Fig. 68 and Fig. 69: Tabatskuri (ca. 2000 m a.s.l.) above the timber line with small cottages and haystacks. (Tristen).



Fig. 70 and Fig. 71: Horses and cattle in the village of Tabatskuri (ca. 2000 m a.s.l.)



Fig. 72: Manual preparation of dung bricks in Tabatskuri.



Fig. 73: Disposing the dung bricks for drying in Tabatskuri.

In Khertvisi (situated at the river Kura between Akhaltsikhe and Akhalkalaki) along the thoroughfare the following species were found in 2019:

Arctium lappa, *Descurainia sophia*, *Geranium pusillum*, *Hordeum murinum* subsp. *leporinum*, *Lactuca serriola*, *Leonurus quinquelobatus*, *Malva neglecta*, *Matricaria discoidea*, *Nepeta mussinii*, *Onopordum acanthium*, *Papaver spec.*, *Sisymbrium loeselii*, *Urtica dioica*.

Along a fence the following rural stand was noted:

Releve. No. 3029: Khertvisi, sample area 4 m², vegetation cover 85 %, N20°. 14.6.2008:
2.2 *Artemisia annua*, 2.2 *Cannabis ruderalis*, 2.2 *Stellaria media*, 1.2 *Atriplex heterosperma*, 1.2 *Anthriscus caucalis*, 1.2 *Polygonum aviculare* agg., 1.1 *Sisymbrium loeselii*, 1.1 *Bromus aff. japonicus*, 1.1 *Xanthium spinosum*, + *Descurainia sophia*, + *Lamium amplexicaule*, + *Capsella bursa-pastoris*, + *Urtica urens*, + *Veronica persica*, 2.2 *Ballota nigra*, 2.2 *Nepeta mussinii*, 1.2 *Artemisia vulgaris*, 1.1 *Cynoglossum officinale*, + *Onopordum acanthium*.



Fig. 74: Small garden near the Kura in Khertvisi.



Fig. 75: *Cannabis sativa* s.l. and *Artemisia annua*.

On the way to the fortress Khertvisi the following species were found on a ruderalized dry grassland:

Achillea biebersteinii, *Anthemis spec.*, *Artemisia absinthium*, *Artemisia scoparia*, *Atriplex micrantha*, *Carduus hobenackeri*, *Chenopodium album*, *Cynoglossum officinale*, *Datura stramonium*, *Descurainia sophia*, *Galium verum*, *Hordeum murinum* subsp. *leporinum*, *Hyoscyamus niger*, *Lappula squarrosa*, *Leonurus quinquelobatus*, *Lepidium perfoliatum*, *Linum austriacum*, *Marrubium cf. vulgare*, *Nepeta mussinii*, *Onopordum acanthium*, *Onosma caucasica*, *Parietaria spec.*, *Peganum harmala*, *Polygonum aviculare* agg., *Sclerchloa dura*, *Sisymbrium loeselii*, *Urtica dioica*, *Veronica persica*, *Xanthium spinosum*.



Fig. 76: *Onopordum acanthium* at the steep slopes of the fortress Khertvisi.



Fig. 77: *Peganum harmala* at the steep slopes of the fortress Khertvisi.



Fig. 78: *Onosma caucasica* at the steep slopes of the fortress Khertvisi (2008).



Fig. 79: *Leonurus quinquelobatus* from a more mesophilous place (2008).

Within the fortress the following was noted:

Artemisia vulgaris, *Asperugo procumbens*, *Capsella bursa pastoris*, *Chenopodium foliosum*, *Cirsium vulgare*, *Cynoglossum officinale*, *Hordeum murinum* subsp. *leporinum*, *Hyoscyamus niger*, *Lappula squarrosa*, *Leonurus quinquelobatus*, *Marrubium* cf. *vulgare*, *Parietaria* cf. *judaica*, *Plantago major*, *Scrophularia chrysantha*, *Sisymbrium loeselii*, *Stellaria media*, *Symphytum asperum*, *Urtica dioica*.



Fig. 80: *Scrophularia chrysantha* (2008).



Fig. 81: *Chenopodium foliosum* (2008).

In Tmogvi (some 10 kilometers from Khertvisi upstream the Kura river) the „common species“ of a village were seen:

Artemisia absinthium, *Cirsium vulgare*, *Cynoglossum officinale*, *Echium vulgare*, *Hordeum murinum* subsp. *leporinum*, *Hyoscyamus niger*, *Onopordum acanthium*, *Salvia aethiopis*, *Salvia nemorosa*, *Sisymbrium loeselii*, *Urtica dioica*.

In “Valodia’s Cottages” Vardsia near the Turkish border we found a recently founded eco-farming with market gardening, orchards, poultry farming, apiculture and cattle and rich ruderal flora.



Fig. 82 and Fig. 83: Orchard, fields and poultry farming at the “Valodia’s Cottages”, Vardsia.

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