1950年採集到的有關中國東北區和內蒙古自治區土壤及植物社會方面的研究材料

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1950年夏季，筆者等應宋達泉教授的邀請，參加了中國東北地區及內蒙古自治區的土壤調查團，一共調查了7個地區。現把這7個地區的概括特點摘錄簡記如下。關於土壤剖面的結構，已由調查團的中國同志們作過記載，並且業已發表了，所以本文不再重複叙述。

一．松花江右岸平原上的榆樹森林草原

此處主要土類是壤土性退化黑鈣土，座落在多層的黃土型土層上，並夾雜有埋藏的針葉及濶葉樹樹幹以及猛獁，犀，野牛[1]等骨骼。在孤立的圍山子山崗上，發現了粘土性微礫質退化黑鈣土，該丘陵上生長的植物的目錄如附表1所示（植物目錄1）。其次再叙述一下松花江流域與阿什河流域分水嶺平原邊界上的黃山丘陵。這個丘陵的土壤是壤土性發育不良的準灰化土，本丘陵被由於山峽森林消滅後而發生的峽谷窪地（овраг）所切斷（植物目錄2）。類似這樣的峽谷窪地也發生在河流的分水嶺平原山坡上。

二．三河區的丘陵草原及森林草原（根河、得爾布爾河及哈烏爾河）

根河流域的植物如附表3所示（植物目錄3），在根河後方的丘陵山坡上有礫

1）原文 Мамонт—是 *Elephas* 即猛獁，Носорог—是 *Rhinoceros* 即犀，бизон—是 *Bos* 即野牛——譯者註。

質黑鈣土和草原的草本植物羣落(植物目錄 4)，而在丘陵與丘陵之間是被草原遮蓋着的黑土型壤土性黑鈣土（植物目錄 5)。本區域北部見到了山峽森林，林下層暗灰色礫質壤土（植物目錄 6)。

三．海拉爾地區的南部黑鈣土草原及半沙漠

在額爾古納河（海拉爾河）右岸的丘陵草原上，是砂性黑鈣土，類似黃土狀粘土，由於氣候極端乾燥，只採到10種草本植物（見植物目錄 7)。在海拉爾河的左岸有內陸砂丘，砂丘上有殘餘的松林(植物目錄 8)。它們的後方是半沙漠區的砂壤土性栗鈣土，被風吹成凹地並結有鹼土皮（植物目錄 9)。

四．呼倫諾爾湖周圍的半沙漠

湖的西方出現一些丘陵，這些丘陵是由堅硬的岩石所組成，丘陵上被覆着栗鈣土，丘陵的斜坡及頂端處栗鈣土中多砂礫，丘陵的平坦處栗鈣土中砂礫較少。湖的東方岸上，能清楚地看到乾縮的過程，漸被半沙漠佔據，平原擴大（植物目錄 10)。在本平原上，內湖乾縮的地方見到了鹼土（植物目錄 11)。

五．大興安嶺的東坡及西坡

對西坡的觀察是在牙克石城進行的。在額爾古納河（海拉爾河）上游見到距河發源地不遠的地方，自山脊到平原有由河流積成的兩個台地：沼澤草甸的和草原的退化黑鈣土。兩個台地都位於山崗的基脚。伴隨着河流漸窄，草原台地也逐漸縮小，最後終至消失。山坡上的土壤是砂礫質粘土性灰化土，其上生有次生的樺木濶葉樹幼林，中間夾雜些將要衰退的原指針葉樹林。

對東坡的觀察是在博克圖城進行的。從該處沿着運輸木材的山道上山，直到大興安嶺山頂，山頂呈桌形，見到在砂礫性半沼澤土上有莎草科植物的濕原，從山頂向下來，山坡更陡峭，生着草原的草本植物及西伯利亞杏(*Armeniaca sibirica* L.)的灌叢，在其中一個山谷上，我們採集到的植物如植物目錄 12 所示，主要是樺木濶葉樹林，生在壤土性的礫質薄瘠的發育不良的灰色山地森林土上。

六．五大連池境界內的森林草原

五大連池火山地區位於北安市西北 70 公里，通向五大連池的道路是舖設在

少丘陵的平原上，這個平原生有低矮的濶葉樹林，如蒙古櫟（*Quercus mongolica* Fisch.）椴（*Tilia amurensis* Kom.）、白樺（*Betula platyphylla* Suk.）、還有些小叢林，由胡枝子（*Lespedeza bicolor* Turcz.）、山玫瑰（*Rosa dahurica* Pall.）及榛子（*Corylus heterophylla* Fisch.）等構成，本地區有它獨特的地形，共14座火山及5座火山口湖泊，周圍有堤壩，本處植物目錄如圖表13所示。古老的火山上生着濶葉樹森林，森林直達山脚，有着微礫質壤土性强烈退化的黑鈣土（植物目錄14）。但此處主要土類却是壤土性微礫質退化黑鈣土，且生有草原的草本植物羣落。

七．齊齊哈爾附近的砂丘

在嫩江左岸，齊齊哈爾的南方及東方有些河邊砂丘，其中一部分是裸露出來的，其餘的一部分是阻滯住的。

由於調查團工作期間短促，所調查的區域又廣濶且多種多樣，所以只能走馬觀花的觀察了一下，調查路綫上的自然地理特點，所記載的也只能做爲土壤—植物學方面研究的初步材料。

（祝廷成譯，宋達泉、陳廷偉校）

MATERIALS RELATED TO THE STUDY OF THE SOILS AND PLANT-ASSOCIATIONS OF NORTH-EASTERN CHINA AND AUTONOMOUS REGION OF INNER MONGOLIA, COLLECTED IN 1950

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In the summer of 1950 the authors of the present paper took part under the leadership of Prof. Sung Ta-chuan in the soil expedition to N. E. China and the Autonomous Region of Inner Mongolia and have visited seven regions, of which a short description follows hereafter. The description of soil profiles, which was compiled together with the Chinese members of the expedition, is omitted as it has already been published.

I. *Elm forest-steppe of the right bank of the Sungari R. (Eastern part of Manchurian plain)*

The main type of the plain is degraded chernozem. As to the isolated rhyolite-hill of Tuanshantsu, situated 50 km. to the south-east of Harbin, its soil is a slightly gravelly, loamy, degraded chernozem. The general list of plants include the following specimens (list I):

Ulmus pumila L.
Rosa dahurica Pall.
Rhamnus dahurica Pall.
Salix koreensis Anderss.
S. integra Thunb.
S. tenuifolia Turcz.
Menispermum dahuricum DC.
Calamagrostis epigeios/L./Roth.
Koeleria mandshurica Skv. sp. nov.
Roegneria ciliaris/Trin./Nevski
Poa brevilogulata Skv. sp. nov.

Carex sp.
Allium macrostemum Bge.
Lilium tenuifolium Fisch.
L. pulchellum Fisch.
Iris ensata Thunb.
I. dichotoma Pall.
Rumex patientia L.
Polygonum divaricatum L.
Salsola collina Pall.
Dianthus chinensis L.
Clematis manshurica Rupr.
C. hexapetala Pall.
Thalictrum petaloideum L.
Lepidium apetalum Willd.
Potentilla chinensis Ser.
Sanguisorba officinalis L.
Geum aleppicum Jacq.
Gueldenstaedtia pauciflora Fisch.
Lespedeza hedysaroides (Pall.) Kitag.
Vicia amoena Fisch.
Hypericum attenuatum Choisy
Bupleurum sp.?
Lysimachia barystachys Bge.
Lappula anisacantha/Turcz./Gürke
Lamium album L.
Calamintha chinensis Benth.
Plantago depressa Willd.
Rubia cordifolia L. var. *pratensis* Max.
Galium verum L.
Aster holophyllus Hemsley
Erigeron annuus L.
Leontopodium discolor Bvd.?
L. leontopodioides Willd.
Tanacetum sibiricum L.

Artemisia sacrorum Ldb. f. *nivea* Kom.
A. sacrorum Ldb. var. *minor* Ldb.
A. scoparia W. et K.
Cardus crispus L.
Cirsium Vlassovianum Fisch.
Serratula centauroides L.
Hypochaeris grandifloria Ldb.

The Huangshan hill situated in the vicinity of Harbinis, strictly speaking, a rim of high river terrace. Its steep slope with the remains of ravine forest is covered by loamy, slightly developed podzolised soil and dissected with active ravines, which have emerged after the destruction of the ravine forest.

Here are encountered (list 2):

Ulmus pumila L.
U. propinqua Koidz. f. *scabra suberosa* Kom.
Armeniaca sibirica/L./Lam.
Securinega suffruticosa/Pall./Rehd.
Spodiopogon sibiricus Trin.
Stipa sibirica Lam.
S. baicalensis Roshev.
Lilium tenuifolium Fisch.
Anemarrhena asphodeloides Bge.
Polygonum divaricatum L.
Clematis hexapetala Pall.
Potentilla multifida L.
Astragalus dahuricus DC.
Bupleurum scorzonerifolium Willd.
Adenophora coronopifolia Fisch.
A. lilifolia Ldb.
Heteropappus hispidus Less.
Leontopodium leontopodioides Willd.
Bidens tripartita L.
Artemisia sacrorum Ldb. f. *nivea* Kom.
A. sacrorum Ldb. var. *minor* Ldb.

The ravines develop on all slopes of the terrace looking towards river valleys

Judged from natural exposures in the ravines the terrace is formed with quarternary continental, partly fresh-water, deposits with buried trunks and branches of coniferous and deciduous trees and remains of mammals (mammoth, rhinoceros, bison).

II. *Hilly steppe and forest-steppe of the Three Rivers district*

(The basin of Gan, Derbul and Haul Rivers)

In this area rocky hill ranges, usually with rounded summits and with slopes of different grades, are separated by valleys with flat bottom and temporary weakly developed river-beds, and sometimes with diminutive lakes*, swamps, rinded alkali spots and lightly loamy alkalised steppe soils. Such soil is observed among the overgrowths of *Iris ensata* Thunb.

For the valley of the Gan River (the largest river of the region) is compiled a short list of plants (list 3).

Salix viminalis L.
S. rossica Nas.
S. mixta Korsh.
Ulmus propinqua Koidz.
Malus Pallasiana Juz.
Rosa dahurica Pall.
Paeonia albiflora Pall.

Slopes of valleys according to their steepness, are covered either by gravel undeveloped chernozems with various undersized steppe grass-vegetation or by southern loamy chernozem also with steppe-vegetation but better developed. Lists of plants characteristic for those two types of vegetations are given below.

In the gravelled steppe (list 4):

Stipa baicalensis Roshev. var. *scarbrida* Rahw.
Koeleria mandshurica Skv. sp. nov.
Roegneria pendulina Nevski
Veratrum nigrum L. var. *ussuriense* Loes.
Allium senescens L.
Lilium concolor Salisb.

* On the bank of one of the lakes were encountered: *Ligularia sibirica* /L./ Cass., *Parnassia palustris* L., *Epilobium palustre* L.

Iris dichotoma Pall.
Polygonum divaricatum L.
Arenaria juncea M. B.
Silene jenissea Poir.
Delphiniuum grandiflorum L.
Pulsatilla ambigua Turcz.
Clematis hexapetala Pall.
Potentilla filipendula Willd.
P. bifurca L.
P. flagellaris Willd.
Vicia pseudoorobus Fisch. et Mey.
V. multicaulis Ldb.
Dictamnus dasycarpus Turcz.
Euphorbia Pallasii Turcz.
Bupleurum scorzonerifolium Willd.
Scutellaria baicalensis Georgi.
Nepeta lavandulacea L. fil.
Veronica linariaefolia Pall.
Cymbaria dahurica L.
Campanula glomerata L.
Adenophora coronopifolia Fisch.
Platycodon grandiflorus A. DC.
Tanacetum sibiricum L.
Artemisia laciniata Willd.
Gerbera anandria /L./ Schultz Bip.
Loamy steppe (list 5):
Stipa baicalensis Roshev.
Koeleria mandchurica Skv. sp. nov.
Dianthus chinensis L.
Potentilla tanacetifolia Willd.
Sanguisorba officinalis L.
Trifolium lupinaster L.
Stellera Chamaejasme L.
Nepeta lavandulacea L. fil.

Veronica sibirica L.
Galium verum L.
Patrinia scabiosaefolia Link.
Scabiosa Fischerii DC.
Campanula glomerata L.
Saussurea japonica DC. var. *subintegra* Rgl.

In the northern part of the region, the steppe merges into forest-steppe, with small birch groves for which a list of plants is given below (list 6):

Betula platyphylla Sukacz.
Salix brachypoda / Trautv. et Mey. / Kom.
S. xerophilla Floder.
Koeleria mandshurica Skv. sp. nov.
Veratrum nigrum L. var. *ussuriense* Loes.
Allium anisopodium Ldb.
Polygonum divaricatum L.
Arenaria juncea M. B.
Silene jenissea Poir.
Dianthus chinensis L.
Potentilla fragarioides L.
Sanguisorba officinalis L.
Trifolium lupinaster L.
Geranium dahuricum DC.
Stellera Chamaejasme L.
Chamaenerium angustifolium / L. / Scop.
Gentiana scabra Bge.
Pedicularis venusta Schang.
Galium verum L.
Patrinia scabiosaefolia Link.
Campanula glomerata L.
Adenophora verticillata Fisch. var. *princeps* Korsch.
Platycodon grandiflorus A. DC.
Aster holophyllus Hemsley
Achillea setacea W. et K.
Artemisia laciniata Willd.

A. sacrorum Ldb. var. *minor* Ldb.

Hieracium umbellatum L.

The presence of cultivated fields on flat saddle backs between hills suggests that they are, possibly, covered with chernozem suitable for agriculture.

III. *Southern chernozem steppe and semi-desert in the region of Hailar*

On the bank of the Argun River (Hailar R.) in the Hailar region, lies the billowy steppe-plain with southern chernozem, which effervesces with HCL at a 60 cm. depth and overlies on pale yellow sand subsoil that resembles loess-like clay. Owing to the last years draughts, the vegetation of the steppe looked depressed; besides it has been much trampled upon by cattle. As a result, but 10 species could be registered (list 7):

Stipa sp.?

Poa botryoides Trin.

Aneurolepidium pseudoagropyrum / Trin. / Nevski

Carex sp.?

Allium sp.?

Potentilla bifurca L.

Vicia amoena Fisch.

Siler divaricatum B. et H.

Veronica incana L.

Artemisia scoparia W. et K.

On the left bank of the river lies a sandy semi-desert with dunes bare, or covered by grass or thin pine-forest, and deflation hollows and rinded salines / solonchak / between them. For the pine-forest a list of plants is given below (list 8):

Pinus silvestris L. var. *mongolica* D. Litw.

Ulmus pumila L.

Malus Pallasiana Juz.

Padus asiatica Kom.

Salix mongolica Siuz.

Ribes diacantha Pall.

Spiraea trilobata L.
Crataegus dahurica Köhne
Caragana microphylla / Pall. / Lam.
Euonymus Maackii Rupr.
Calamagrostis epigeios / L. / Roth.
Koeleria mandshurica Skv. sp. nov.
Agropyrum barginensis Skv.
Allium leucocephalum Turcz.
Chenopodium acuminatum Willd.
Papaver nudicaule L. var. *amurense* Busch
Medicago falcata L.
Oxytropis oxyphylla Pall.
Lespedeza hedysaroides / Pall. / Kitag.
Vicia multicaudis Ldb.
Cynanchum sibiricum R. Br.
Adenophora coronopifolia Fisch.
Serratula centauroides L.

The pine forests of the semi-desert must be strictly protected for with their seeds* all dunes of the semi-desert, which in some places stretch for several kilometers, might be afforested.

The soil of the rinded saline which borders a little fresh-water lake has been investigated and a list of saline plants has also been compiled. It includes the following specimens (list 9):

Atropis Hauptiana / Trin. / V. Krecz.
Agropyrum cristatum / L. / Gaertn.
Allium odorum L.
Polygonum rigidum Sukacz.
P. sibiricum Laxm.
Chenopodium glaucum L.
C. acuminatum Willd.
Atriplex fera / L. / Bge.
A. sibiricum L.
Thermopsis lanceolata R. Br.

* In Harbin nearly 20-years old pines are already grown from Hailar seeds.

Caragana microphylla Lam.
Saussurea glomerata Poir.
Taraxacum sinense Dahlstedt

IV. *Semi-desert around Dalai-Nor Lake*

Westward from the lake prevail small rocky hills with narrow undrained valleys between, opening in to the lake. Chestnut-brown soil predominates. Steep hill slopes are covered with undeveloped gravelly soils and on the gentle and flat saddle-backs there are encountered slightly developed gravelly chestnut loamy soils. Such soils have been investigated in a place 2-3 km. from the bank, direct opposite the middle of the lake. Low, dried up grass consisted at the time of 4 species only. The list of semi-desert plants was enlarged further-on up to 20 species, collected at various spots along our route (list 10).

Lasiagrostis splendens /Trin./ Kunth.
Stipa baicalensis Roshev.
Allium bidentatum Fisch.
A. odorum L.
Lepidium latifolium L.
Stevenia alyssoides Ad. et Fisch. var. *monosperma* W. Busch
Orostachys spinosa/L./C.A.M.
Potentilla acaulis L.
Medicago falcata L.
Bupleurum bicaule Helm.
Convolvulus Ammannii Dear.
C. sagittifolius Fisch.
Tournefortia sibirica L.
Cymbaria dahurica L.
Artemisia Halodendron Turcz.
Echinopsilon divaricatum Kar. et Kit.

Along the southern and eastern banks of the lake more or less plain semi-desert stretches. Unfortunately, the road around the lake approaches its banks but in few places, while in most places it lies several kilometers away from them. Nevertheless all the observed sections on the bank of the lake indicate to the present drying up of the lake. Eastward, nearly opposite the middle of the lake,

but several kilometers away from it, a typical saline was met on the plain, which appeared in the place of a dried up lake (with fragments of fresh-water molluscs). The following plants have been encountered there (list 11):

Carex sp.?
Atropis Hauptiana/Trin./ V. Krecz.?
Polygonum sibiricum Laxm.
Atriplex fera /L./ Bge.
Sueda ussuriensis Iljin (*S. heteroptera* Kit.)

The whole of the above-described region represents pasture-land of Barguts, except for the narrow strips on the river terraces which are covered with southern chernozem and are being cultivated. It is worth to mention that near Chalainor St. negative potato-beds were seen, the depth of which was equal to the height of the potato stems.

V. *Western and eastern slopes of the Great Hingan*

The starting point for the excursion to the western slopes of the Great Hingan was Yakeshi St., wherefrom a 147 km. trip along a branchline running up the valley of upper reaches of Argun R. (Hailar R.) were made. In so far as observation from the railway car window permitted to judge the valley near its way out of the mountains into the Barga plain forms an alluvial stripe with river bank forests and meadows. Farther up, on the elevated second terraces, ranging into the slopes of neighbouring hills, spreads out the steppe, above which the steep slopes and the summits are covered with forest. Still farther with the narrowing of the valley the steppe-stripes are growing narrower too and at last, at the upper reaches of the valley the steppe disappears completely and the steep wooded slopes meet with the alluvial bottom of the valley where the meadows change into bog-marshes covered with birch-trees- *Betula ovalifolia* Rupr., and blue-berry- *Vaccinium uliginosum* L. At the 41-st km. Siding the examination of the soil cross-section, near the railway evinced loamy, strongly degraded chernozem which proves that at this place the steppe gave way to the forest. At the 136-th km. Siding the soil was investigated at a spot at the border between the alluvial virgin soil and a rather steep slope covered with a thin young birch and larch wood. The soil was found to be a loamy, gravelly podzol. The described forests have to be considered as secondary ones, which replaced the virgin larch-forest.

Our point of departure for the examination of the eastern slopes of the Great Hingan was Pohotu St. from where an excursion by a branch line was made towards the upper reaches of the Chol R. The valleys there proved to be steep-sided and narrow, with steep slopes on which grows *Armeniaca sibirica* L. on sunny spots, while the summit of Great Hingan, crossed by the railway represents a narrow winding plateau with steep eastern slopes. The bottom of the valleys is occupied by damp meadows and bog marshes with the same birch–*Betula ovalifolia* Rupr. At 112-th km. Siding a soil cross-section was made in a slightly hillocked meadow with revealed semi-marshy, loamy, gravelly soil. Our attempts to finding a virgin larch-forest on the above mentioned plateau was not successful. A pit left by wrenched out roots of a fallen down old larch tree amidst a somewhat cut larch and birch forest on steep shadowy slope was used for the examination of the soils of that region. The soil was found loamy, gravelly, slightly developed, grey mountain-forest soil of small thickness. For that slope a list of plants was made (list 12):

Salix Raddeana Laksch.
Spiraea media Schmidt
Dasiphora fruticosa /L./ Rydb.
Rosa acicularis Lindl.
Vaccinium vitis idaea L.
Athyrium filix femina /L./ Roth.
Cymnadenia conopsea /L./ R. Br.
Dianthus chinensis L.
Cimicifuga dahurica Max.
C. simplex Wormsk.
Fragaria orientalis Los.
Sanguisorba officinalis L.
Trifolium lupinaster L.
Hedysarum alpinum L.
Vicia unijuga Al. Br.
Dictamnus dasycarpus Turcz.
Chamaenerium angustifolium /L./ Scop.
Bupleurum longiradiatum Turcz.
Gentiana macrophylla Pall.

Veronica sibirica L.
Valeriana officinalis L.
Scabiosa Fischerii DC.
Aster scaber Thunb.
Cacalia hastata L.
Serratula atriplicifolia B. et Hook.
Dasiphora fruticosa /L./ Rydb.

VI. *Forest-steppe of the Wutalienchi area*

Wutalienchi is located 70 km. N. W. from Peian. For the most part, the road runs through slightly billowy plain covered with a peculiar plant-association dwarfish deciduous forest which seems from a distance to be a vast shrub-thicket. There were encountered as shrubs: *Quercus mongolica* Fish., *Tilia amurensis* Kom., *Betula platyphylla* Suk., and shrubs: *Lespedeza bicolor* Turcz., *Rosa dahurica* Pall. and *Corylus heterophylla* Fisch. Neither the list of grassy vegetation has made nor the soil studied. Wutalienchi area represents a gigantic natural volcanic museum because there are found as much as 14 volcanoes, 5 barrier lakes and lava streams stretching for many kilometers. The last registered eruption occured in 1721—1722. Only old volcanoes, covered mostly with oak-forest were observed; the end of the lava stream was also examined and a list of plants—pioneers and of those growing on the unweathered lava was made (list 13).

Populus suaveolens Fisch.
Malus Pallasiana Juz.
Salix mongolica Siuz.
Spiraea salicifolia L.
Rubus melanolasius Focke var. *discolor* Kom.
Euonymus Maackii Rupr.
Sambucus racemosa L.
Woodsia sinuata /Hook./ H. Christ.
Dryopteris fragrans /L./ Schott.
Eragrostis pilosa L.
Allium senescens L.
Rumex maritimus L.

Polygonum minus Huds.
Chenopodium album L. var. *pseudoficifolium* Turcz.
Axyris amaranthoides L.
Melandrium firmum /S. et Z./ Rohrb.
Pulsatilla dahurica Sprgl.
Sedum Aizoon L.
Orostachys malacophylla /Pall./ Fisch.
Potentilla tanacetifolia Willd.
Cicuta virosa L. var. *tenuifolia* Koch.
Sium cicutaefolium Gmel.
Scutellaria dependens Max.
Bidens tripartita L. var. *pinnatifida* Turcz.
Artemisia vulgaris L.
Lactuca squarrosa Miq.

There was studied also the soil and lists of plants of the forest-border at the foot of one of the volcanoes were made (list 14).

Betula dahurica Pall.
Quercus mongolica Fisch.
Salix Raddeana Laksch.
Populus suaveolens Fisch.
Corylus heterophylla Fisch.
Rosa dahurica Pall.
Lespedeza bicolor Turcz.
Pteridium aquilinum /L./ Kuhn.
Equisetum silvaticum L.
Spodiopogon sibiricus Trin.
Calamagrostis epigeios Roth.
C. brachytricha Steud.
Poa pseudonemoralis Skv. sp. nov.?
Roegneria amurensis /Drob./ Nevski
Hemerocallis minor Mill.
Allium senescens L.
Majanthemum bifolium DC.
Convallaria majalis L.

Dianthus chinensis L.
Cimicifuga simplex Wormsk.
Aconitum Kusnezoffii Rchnb.
Clematis manschurica Rupr.
Thalictrum aquilegifolium L.
Aruncus asiaticus A. Pojark.
Rubus saxatilis L.
Fragaria orientalis L.
Sanguisorba officinalis L.
S. tenuifolia Fisch.
Vicia pseudoorobus F. et Mey.
Angelica dahurica Rupr.
Gentiana triflora Pall.
Plectranthus glaucocalyx Max.
Veronica sibirica L.
V. Komarovii Monj.
Plantago depressa Willd.
Galium verum L.
Patrinia scabiosaefolia Link.
Valeriana officinalis L.
Campanula glomerata L.
Adenophora latifolia Fisch.
Codonopsis lanceolata B. et H.
Aster scaber Thunb.
Artemisia sacrorum L.
Ligularia sibirica /L./ Cass.
Atractylodes ovata Thunb.
Cirsium arvense Scop.
Scorzonera albicaulis Bge.

The same has been done for the steppe on the gentle slope looking towards the lakes (list 15).

Salix brachypoda Trautv.
S. xerophilla Floder.
Corylus heterophylla Fisch.

Lespedeza bicolor Turcz.
Stipa sibirica Lam.
S. effusa (Max.) Nakai
Convallaria majalis L.
Polygonum divaricatum L.
Silene jenissea Poir.
Dianthus chinensis L.
Paeonia albiflora Pall.
Thalictrum simplex L.
T. squarrosum Steph.
Potentilla multifida L.
Sanguisorba officinalis L.
Trifolium lupinaster L.
Geranium Vlassovianum Fisch.
G. dahuricum DC.
G. Wilfordii Max.
Pimpinella Thellungiana Wolff
Angelica dahurica Rupr.
A. laevigata Franch.
Lysimachia dahurica L.
Scutellaria baicalensis Georgi
Lycopus lucidus Turcz.
Pedicularis spicata Pall.
Galium boreale L.
G. verum L.
Scabiosa Fischerii DC.
Adenophora sp.?
Platycodon grandiflorus A. DC.
Aster scaber Thunb.
A. holopyllus Hemsley
Achillea ptarmicoides Max.
Tanacetum sibiricum L.
Ligularia mongolica DC.
L. speciosa F. et M.

Saussurea Derbeckii Kom.
S. odontolepis Schultz Bip.
S. japonica DC. var. *pinnatifida* Bge.
Serratula coronata L.
On the roadway, besides, was noticed:
Arabis pendula L.

The soil in the outskirts of the forest is loamy, slightly-gravelled, degraded chernozem. And the soil of the steppe also is slightly gravelled, degraded chernozem. Wutalienchi area begins already to be populated more densely, therefore it seems advisable to separate a part of it as a National park-in order to preserve the virgin nature of this remarkable spot of N. E. China.

VII. *Dunes near Tsitsikar*

Tsitsikar is situated on the left bank second terrace of Nonni R. and is surrounded from south and west by a stripe of river-dunes. Southern dunes are weakly moving and only slightly covered with grass, while the eastern ones are covered with perennials. Both are much overgrown with weeds and the southern ones are here and there used for melon-fields.

List of dune-vegetation consisted of the following specimens (list 16):

Ulmus pumila L.
Crataegus pinnatifida Bge.
Salix sp.?
Equisetum variegatum Schleich.
Echinochloa crus galli /L./ Roem. var. *longisetum* Doll.
Stipa baicalensis Roshev.
Chloris virgata Swartz
Diplachne squarrosa /Trin./ Max.
Koeleria mandshurica Skv. sp. nov.
Agropyrum cristatum /L./ Gaertn.
Allium senescens L. *flora albo*
A. odorum L.
Rumex acetosella L.
R. maritimus L.
Polygonum divaricatum L.

P. mandshuricum Skv.
P. minus Huds.
Chenopodium acuminatum Willd.
C. album L. var. *stenophyllum* Makino
Kochia prostrata /L./ Schrad.
Corispermum confertum Bge.
Agriophyllum gobieum Bge.
Salsola sp.?
Amaranthus retroflexus L.
Dianthus chinensis L. var. *silvaticus* Koch.
Delphinium grandiflorum L.
Clematis hexapetala Pall.
Potentilla tanacetifolia Willd.
P. chinensis Seringe
P. supina L.
Sophora flavescens Ait.
Gueldenstaedtia pauciflora Fisch.
Astragalus adsurgens Pall.
A. melilotoides Pall.
A. dahuricus DC.
A. chinensis L. fil.
Lespedeza dahurica /Laxm./ Schindl.
L. trichocarpa Pers.
Kummerovia stipulacea /Max./ Makino
Vicia amoena Fisch.
Erodium Stephanianum Willd.
Hibiscus trionum L.
Siler divaricatum B. et H.
Convolvulus sagittifolius Fisch.
Cuscuta chinensis Lam.
Orobanche amurensis G. Beck.
Plantago depressa Willd.
Rubia cordifolia L. v. *pratensis* Mix.
Xanthium strumarium L.

Artemisia Sieversiana Willd.

A. integrifolia L.

A. scoparia W. et K.

VIII. *Conclusion*

The limited time of the activity of the soil-expedition and the vastness and peculiarity of the visited regions allowed but to mark briefly the physico-geographical features of the areas crossed by our route: therefore our report must be considered only as a collection of data of a geo-botanical survey.

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