

**REVUE ROUMAINE
DE GÉOLOGIE
GÉOPHYSIQUE
ET GÉOGRAPHIE**

SÉRIE DE

GÉOGRAPHIE

CONTRIBUTIONS ROUMAINES AU
XXII^{ème} CONGRÈS
MONTREAL 1972 INTERNATIONAL
DE GÉOGRAPHIE

TOME 16

1972, N° 1

EDITIONS DE L'ACADEMIE DE LA REPUBLIQUE SOCIALISTE DE ROUMANIE

COMITÉ DE RÉDACTION

Rédacteur en chef:

T. MORARIU, membre correspondant de l'Académie
de la République Socialiste de Roumanie

Rédacteur en chef adjoint:

V. TUFESCU

Membres:

V. MIHĂILESCU, C. HERBST, H. GRUMĂZESCU,
I. CONEA, P. GAȘTESCU, L. BADEA, I. VELCEA

Secrétaire scientifique de rédaction:

Ș. DRAGOMIRESCU

Les manuscrits, les livres et les revues proposés en
échange ainsi que toute correspondance seront adres-
sés à la Rédaction : 1, rue D^r Burghеле, Bucarest,
20, Roumanie

Editura Academiei Republicii Socialiste România
Str. Gutenberg 3 bis, Bucarest, Roumanie

Tome 16, N° 1, 1972

S o m m a i r e

	<u>Page</u>
VINTILĂ MIHĂILESCU, Géographie et organisation du territoire	3
NICOLAE AL. RĂDULESCU, Modification du milieu physique-géographique en Roumanie comme résultat de l'activité humaine	9
T. MORARIU, I. MAC and I. CRIȘAN, The agricultural capacity of territories assessed by the components of the geographical landscape	15
NICOLAE POPP, The problem of Quaternary paleodeltas in Romania	21
VALERIA VELCEA, Case history in modelling longitudinal cross-sections in the Carpathian area	31
I. BADEA et GH. NICULESCU, Considérations sur l'élaboration des cartes géomorphologiques générales (Carte géomorphologique de la plaine de l'Argeș inférieur)	37
VASILE SENCU, La carte du karst des monts de Locva (Banat) suivant la légende internationale	41
A. BAN and ZENOVIA DOBROTESCU, Fossil eolian forms in loess deposits on the Danube terrace in the West of the Oltenian Plain	43
ILIE D. ION, The study of correlated deposits by means of oscillogram, rhythmogram and rose-diagram (with examples from North Oltenia)	51
I. ZĂVOIANU, The area required for the formation of various size basins and maintenance of their channels	57
PETRE GĂȘTESCU and ARIADNA BREIER, Romania's waters and their potential	65
ELENA TEODOREANU, A new cartographic method for the representation of maximum precipitation amounts in the course of 24 hours	75
OVIDIU TOMA, A graphic method for the geoeccological study of a territory	81
VICTOR TUFESCU, Changements actuels dans la typologie des villages roumains	85
ION VELCEA, The urbanization process of the rural settlements in Romania	93
VASILE CUCU, Economical and demogeographical premises in the urbanization of the Socialist Republic of Romania	103
PETRE DEICĂ, Les grandes villes dans le système des établissements urbains de Roumanie	111

	<u>Page</u>
ADRIAN CARANFIL, The urban evolution of Timișoara in the last century with special emphasis on urban transportation	119
IOANA ȘTEFĂNESCU. Fruit growing in Romania	125
 La vie scientifique	
Le deuxième Colloque national de la géographie du tourisme (<i>Lucian Badea</i>)	133
 Comptes rendus	
T. MORARIU et VALERIA VELCEA, Principii și metode de cercetare în geografia fizică (Principes et méthodes de recherche dans la géographie physique) (V. <i>Tu-fescu</i>)	137
* * Piemontul Getic, studiu de geografie economică (Le Piémont gétique, étude de géographie économique) (N. <i>Al. Rădulescu</i>)	138
M. C. BĂCESCU, G. I. MÜLLER, M. T. GOMOIU, Ecologie marină. Vol. IV. Cercetări de ecologie bentală în Marea Neagră (Marine ecology. Vol. IV. Researches of benthal ecology in the Black Sea) (O. <i>Șelariu</i>)	139

GÉOGRAPHIE ET ORGANISATION DU TERRITOIRE

par V. MIHĂILESCU

Se începe prin caracterizarea organizării naturale și celei sociale (administrative, economice, culturale, turistice etc.) a teritoriului și se demonstrează că, la baza organizării sociale a teritoriului stă organizarea naturală (prin înglobare totală sau parțială a unităților transformate de om — adică a *regiunilor geografice*). Geografia vine în sprijinul organizării sociale a teritoriului numai dacă oferă utilizatorilor date asupra obiectului său (întregul teritorial de la localitate la planetă) nedisociat. Într-adevăr, rolul acestei discipline științifice este — sub forma ei aplicată — să contribuie la împiedicarea deciziilor unilaterale cînd acestea nu țin seama de echilibrul dintre factorii naturali și cei sociali, indiferent dacă limitele unității supusă operațiilor de organizare teritorială sînt naturale sau convenționale.

L'organisation du territoire suppose l'intervention de l'homme dans la corrélation des activités sur un espace donné ; mais il n'est pas difficile à admettre qu'il y a aussi une organisation naturelle du territoire et que ce qu'il en résulte est la *région naturelle*... sans doute, abstraction faite de l'état de « conscience » qui caractérise l'action d'organisation humaine (sociale) de l'espace terrestre. Il y a — comme on le sait très bien — des régions naturelles simples et des régions naturelles complexes. Les premières dérivent de l'association des éléments composants (relief, nature du terrain, climat, eau, végétation, faune) — les mêmes (ou presque les mêmes) sur des surfaces très variables comme dimensions — et qui sont le siège des fonctions similaires ou presque similaires. Par exemple, la partie est de la Plaine Roumaine — à laquelle (encadrée entre le Danube et la vallée du Buzău), nous donnons, d'après Murgoci (1872 — 1925), le nom de Bărăgan — est une région naturelle simple, relativement, par son relief de plaine monotone, par son altitude absolue basse (entre 20 — 100 m), et, surtout, par son climat, végétation, faune et sols de steppe continentale, déterminantes pour ses fonctions (pastorale et de chasse dans le passé, céréalrière aujourd'hui). Ces traits naturels, avec leur reflet dans l'utilisation du terrain, étant les mêmes — avec des différences locales peu importantes — entre le Danube au sud et à l'est,

le Buzău au nord et la forêt vers l'ouest, il n'y a pas eu des difficultés à adopter, même dans les manuels et les cartes, l'opinion de Murgoci, bon connaisseur de la région surtout par ses études « agrogéologiques ».

Mais, l'organisation naturelle du territoire va plus loin. Elle associe et établit des corrélations permanentes entre les régions simples, chacune différente comme paysage et fonction, mais — dans leur ensemble — complémentaires ou gravitant vers un centre ou un axe polarisateur. Nous donnons un exemple de région naturelle complexe de petite dimension : la Plaine du bas Siret, constituée de sous-unités relativement hétérogènes (plaine sous-collinaire de Râmnicu Sărat, haute plaine fragmentée de Covurlui, plaine de terrasse de Tecuci, basse plaine (« lunca ») du Siret inférieur), vers laquelle gravitent les trois autres... ce qui imprime une unité naturelle à toute la Plaine du bas Siret.

Donnons un autre exemple, un des plus beaux : la Roumanie, bâtie autour des Carpates SE sous la forme d'un vaste amphithéâtre concentrique, traversé par des vallées radiaires et constitué par de grandes unités échelonnées, de plus en plus basses, vers l'extérieur et complémentaires comme paysages et fonctions. De ces proportions équivalentes et de cette disposition harmonieuse est dérivée l'unité naturelle et, par son évolution historique, l'unité ethnique et politique de la Roumanie. On pourrait multiplier les exemples (les uns indubitables, les autres sujets à discussion), mais nous nous arrêtons ici, parce que notre but fut, seulement, de fixer un point de départ dans notre exposition.

Sans doute, nous ne pouvons plus parler aujourd'hui de régions naturelles virgines — à quelques exceptions près — mais surtout de régions naturelles plus ou moins transformées par les hommes. On réserve — nous avons cette impression en consultant la littérature géographique actuelle — l'expression de « région géographique » à toute région naturelle modifiée par l'intervention de longue durée des populations qui l'avaient habitée et utilisée. Pourtant, n'importe dans lequel degré d'humanisation (comme paysage et fonctions) se trouve une région naturelle, les facteurs naturels ne cessent pas d'actionner chacun à sa manière et, surtout, tous ensemble, associés, c'est-à-dire organisés. Les facteurs naturels représentent donc une réalité permanente ; seulement la géographie actuelle n'offre pas ses informations en isolant les éléments du complexe territorial, mais elles les présente dans leurs relations réciproques comme facteurs et comme produit d'un tout qui est la région géographique (résultante de la confrontation Homme-Milieu). Pourtant, même dans ce cas-là, la géographie, pour les uns, semble rester dans une situation discutable, tant qu'elle persiste à utiliser, dans ses études, les régions naturelles correspondant, comme limite — mais pas totalement, comme paysages et fonctions — aux régions géographiques.

Cependant, la réalité géographique régionale, dans le sens présenté plus haut — comme une forme obligatoire et organisée de collaboration entre l'homme et son milieu — s'est avérée évidente et si impérative, qu'à peine depuis peu de temps on a commencé à actionner dans l'organisation économique du territoire, sans tenir compte des limites et même du contenu des régions géographiques. Cette position fut considérée, par les uns, une lutte contre le « déterminisme géographique », mais aujourd'hui elle est connue sous un tas de termes : aménagement du

territoire, systématisation territoriale, organisation spatiale de la société, etc. chacun avec un sens relativement différent mais tous ayant en vue le même problème : organisation de l'espace terrestre, au premier plan, pour la production maximum et optimum ; pas exclusivement dans ce but, mais dans celui, général, d'assurer la santé, l'entretien et le progrès (moral et technique) de la population.

Dans ce qui suit, nous nous arrêtons à l'expression « organisation (humaine ou sociale) du territoire ». En quelle mesure et comment la géographie peut contribuer à atteindre ce but ? Tout d'abord en convaincant les hommes d'action que, à la base de l'organisation du territoire, doit continuer à être mise l'analyse de la réalité territoriale dans les limites des régions naturelles transformées par l'homme, c'est-à-dire dans les limites des régions géographiques. Ce serait une grande erreur qu'accréditer l'opinion que l'action — conjuguée — des facteurs naturels, avec ou sans l'intervention de l'homme, cesse du moment où la société s'applique à changer un équilibre naturel existant, par un autre plus conforme à ses intérêts (économiques, culturels, administratifs, physiologiques, etc.) et établit, dans ce but, des périmètres qui ne correspondent plus aux périmètres naturels. On connaît et on cite assez de cas dans lesquels l'ignorance — même partielle — des réalités géographiques totales a abouti à des échecs, si non à des désastres.

Le plus grand service que la géographie peut apporter à la solution des problèmes d'organisation territoriale (économique, administrative, culturelle, touristique, etc.) suppose l'application obligatoire du principe de base de la géographie actuelle : la zone d'interférence des enveloppes terrestres (la biosphère dans le sens général, de milieu favorable à la vie) est un produit non dissociable — quoique en transformation perpétuelle — dont l'homme aussi est une partie intégrante. La géographie ne considère pas l'homme comme un être privilégié, mais seulement comme un facteur qui, pour exister et progresser, est obligé à faire des efforts (techniques et intellectuels), considérablement supérieurs aux efforts faits par les autres habitants de la terre. De là dérive la nécessité d'utiliser le milieu environnant (naturel et social) dans son ensemble — comme une unité organique — sans complexe d'infériorité, mais aussi sans surestimation de ses propres possibilités et ressources. C'est donc dans la conception de la géographie comme science des ensembles territoriaux non dissociables et dans l'information critique — dérivée de cette conception — sur la manière adoptée par l'humanité dans l'utilisation des conditions et des ressources de notre planète, que réside la contribution de cette science à l'œuvre d'organisation du territoire.

On ne doit pas confondre, sans doute, les unités d'organisation territoriale, sociale avec les unités d'organisation naturelle (par exemple un département avec une unité géographique quelconque), mais il n'est pas difficile de constater que, dans n'importe quelle unité territoriale sociale (économique, administrative, touristique, etc.) on retrouve, en totalité ou en partie, des régions géographiques dont la réalité s'impose aux organisateurs. Le département — par exemple Ialomița — est constitué par un couloir fluvial — région géographique assez nette — et deux fragments du Bărăgan (plaine steppique dont nous avons déjà parlé). Les conditions et les ressources de l'espace géographique respectif repré-

sentent toujours le problème essentiel de l'économie du département de Ialomița dans ses nouvelles limites administratives ; mais les transformations subies par l'ancienne steppe de Bărăgan ont exigé un nouveau centre pour l'orientation générale et pour le contrôle des activités et de la vie des habitants du département. Pendant l'époque du drainage des céréales exportées par la voie du Danube, la ville-port de Călărași était nécessairement indiquée comme résidence départementale ; mais aujourd'hui, quand les plaines steppiques sont bien cultivées et bien peuplées et quand au long de la vallée inférieure de la Ialomița passe la grande voie de communication qui traverse le Danube sur le nouveau pont de Hirșova et rencontre à Slobozia l'ancienne chaussée de Brăila, cette ville modeste (Slobozia) s'est imposée comme résidence départementale. Question d'organisation spatiale qui ne cache pas pourtant le rôle des conditions géographiques permanentes.

Pour le grand public et même pour des « spécialistes » qui n'ont plus eu de contact avec notre science depuis l'enseignement secondaire, la géographie est restée une discipline qui s'occupe de la localisation et, tout au plus, de la répartition des données ou des phénomènes terrestres. Pourtant, même dans ce dernier cas, une information générale, par exemple sur la distribution des villes en Roumanie d'il y a 20—30 ans, offre une première image sur leur distribution inégale et provoque la recherche d'une explication (les conditions sociales et historiques du passé, mais aussi les conditions géographiques de chaque ville, la position par rapport aux grandes régions géographiques du pays, le réseau des voies de communication existantes, les ressources du hinterland, etc.). Pour un géographe véritable, une carte de répartition d'un phénomène est un prétexte de commentaire qui consiste dans l'intégration de ce phénomène dans l'ensemble territorial non dissocié. Au commencement, dans la nouvelle politique de normalisation de la répartition des villes sur le territoire, on n'a pas trop tenu compte des conditions géographiques régionales ; mais, avec le temps, on a pu constater — les villes n'étant pas seulement des centres de production mais aussi de polarisation des ressources, des activités et des intérêts complexes de la population rurale travaillant dans des conditions toujours différentes — qu'il est utile de s'adresser aux géographes pour obtenir une documentation sur le spécifique géographique non dissocié de l'espace polarisé par chaque ville. On arriva de cette manière à comprendre que la géographie peut rendre des services non seulement en qualité d'informatrice classique, mais aussi comme science des ensembles territoriaux, considérés comme résultant de l'équilibre entre les facteurs naturels et les facteurs sociaux. Les 20—25 dernières années on a appliqué ces principes dans plus de 80 monographies des villes de Roumanie, dans plusieurs monographies géographiques régionales commandées par des instituts de projection. On peut donc affirmer que, dans notre pays on est passé, depuis au moins un quart de siècle, d'une géographie systématique purement informative à une géographie dynamique ayant comme objet les ensembles territoriaux non dissociés et passant de la théorie à l'application qui concernent aussi l'organisation du territoire. Le rôle de la géographie est, dans cette collaboration, d'empêcher les décisions unilatérales qui ne tiennent pas compte de l'équilibre, obligatoire, entre les facteurs naturels et les facteurs sociaux. Nous finirons

cette exposition sommaire par une affirmation qui pourrait être un truisme : la géographie comparée des régions d'un pays et des pays du globe entier — sans doute une géographie d'ensemble, critique, et sans ambiguïtés — sera capable de montrer quels sont les défauts dans l'organisation culturelle, économique, politique de chaque pays et de la terre dans sa totalité ; car, parmi toutes les sciences de la terre et de la société, conçue — nous répétons à dessein — comme une science à objet non dissociable — la géographie est la plus ancienne et la « seule » qui, même pendant l'analyse de l'ensemble territorial par éléments, ne perd pas de vue l'ensemble territorial dans lequel l'élément respectif est en même temps partie composante et facteur. La géographie représente donc un correctif à la tendance presque générale de spécialisation qui sépare l'élément analysé de l'ensemble auquel il appartient. Il est si évident aujourd'hui le péril qui court l'humanité à cause de l'économie qui ne prend en considération les ensembles territoriaux, qu'on assiste, depuis 25—30 ans, à l'apparition de sciences, nouvelles ou renouvelées, qui ont comme objet justement ces ensembles (Sciences de la région, Equistique, Urbanisme, Économie spatiale, Ecologie, etc.). Les géographes, préoccupés pendant tout ce temps-là de répondre, par une spécialisation excessive, à l'accusation de superficialité, ont perdu le moment de s'insérer dans la lutte pour la reconstitution (respectivement pour la conservation) de l'équilibre rompu entre les forces de la nature et les forces de la société. Il serait absurde pour la géographie de prétendre le monopole dans cette lutte, mais elle doit reprendre sa place entre toutes les disciplines scientifiques, de recherches et techniques, qui sont engagées à assurer le développement normal de la vie sur notre planète.

Reçu le 10 décembre 1971

*Institut de géographie
Académie de la République
Socialiste de Roumanie
Bucarest*

MODIFICATION DU MILIEU PHYSIQUE-GÉOGRAPHIQUE EN ROUMANIE COMME RÉSULTAT DE L'ACTIVITÉ HUMAINE

par N. AL. RĂDULESCU

Mediul fizico-geografic al României a suferit în cursul tuturor etapelor istorice modificări esențiale, ca o consecință a unei locuiri continue a teritoriului, începînd cu peste un milion de ani în urmă — după dovezi arheologice.

În epoca bronzului s-au făcut unele ușoare amenajări ale litoralului Mării Negre, ca rezultat al activității vechilor greci în cetățile Histria, Tomis, Callatis. În antichitate s-au creat mari valuri înalte prevăzute cu șanț — pentru apărare sau delimitare de teritorii, în Dobrogea, Moldova de sud, la contactul dintre Subcarpați și Cîmpia Română, ca și în zona dintre dealurile vestice și Cîmpia Tisei. De asemenea s-au creat platforme pe multe virfuri de munți mici pentru instalarea de cetăți de către Daci, în special în Carpații Meridionali. Într-o perioadă de circa două milenii (mileniul I î. e. n. și mileniul I după) pe o suprafață de cîmpie care acoperă 1/4 din teritoriul României s-a creat un relief antropoc de gorgane (movile) înalte astăzi de 1–20 m, care a modificat sensibil peisajul. Multe sînt funerare, dar se pare că toate au un rol de delimitare de teritorii. În unele părți ale țării ele se suprapun pe limitele moșiilor satelor actuale, dovedind o continuitate de diviziune de proprietate, surprinzătoare. În tot cursul evului mediu suprafața pădurii a fost micșorată în vederea dezvoltării agriculturii și instalării așezărilor omenești, ajungînd ca de la 75% acoperire forestieră azi să existe numai 25%.

Cele mai mari modificări ale mediului geografic s-au realizat în ultimul sfert de veac, cînd s-a defrișat și despădurit cîmpia aluvială (500.000 ha) a Dunării — ca o consecință a indiguirii, s-au amenajat pentru culturi irigate peste un milion ha, fapt care a ridicat sensibil umiditatea în sol și aer și s-au terasat numeroși versanți din Piemontul Getic, Podișul Moldovei și Dobrogea, planîndu-se cu vii și livezi, frînîndu-se ritmul eroziunii.

Transformările mediului geografic au afectat și mediul acvatic prin realizarea a sute de lacuri de retenție, piscicole și cu scop energetic. Sînt de menționat activitatea de combatere a poluării apei și aerului, ca și crearea de rezervații naturale pentru ocrotirea naturii.

De tout temps, les modifications du milieu physique dues à l'homme ont constitué une préoccupation pour les géographes. La thématique

du XXII^{ème} Congrès international de géographie qui aura lieu à Montréal au cours de l'été de 1972 prévoit la discussion de ce sujet par la V^{ème} section, celle de géographie historique.

Bien qu'elle aurait pu avoir lieu dans d'autres sections aussi, là où on a également prévu des débats concernant le milieu géographique (section IX — *Qualité du milieu*, section XI — *Qualité du milieu urbain*), sa répartition à la section de géographie historique peut avoir des effets positifs et déterminer des exposés systématiques par étapes historiques concrètes.

La Roumanie a subi, au cours des âges, de grandes transformations de ses conditions naturelles, étant peuplée, à toutes les étapes de l'histoire, comme le prouvent les vestiges concrets des civilisations respectives, signalés par les chercheurs roumains ou étrangers.

L'existence d'agglomérations paléolithiques et néolithiques attestent la présence, sur le territoire de l'ancienne Dacie, de populations qui ont occupé sans interruption les terrains propres à l'habitat et qui ont tiré leur existence de l'exploitation du milieu géographique local, assez favorable à la vie. Les découvertes anthropologiques de Bugiulești, en Olténie, témoignent de la présence, il y a environ un million d'années, d'habitants (préhominiens?) qui ont utilisé des os de bêtes peu façonnés, comme premiers outils. Par conséquent, il est très probable que, au cours d'un million d'années, sur le territoire de l'actuelle Roumanie, les rapports entre l'homme et le milieu géographique ont contribué à l'apparition de modifications du paysage géographique.

Vu la densité réduite de la population ainsi que la technique non évoluée propres aux habitants des époques *paléolithique* et *néolithique*, l'action de modification du milieu physique sur le territoire roumain n'a pas été saisissable. Des témoignages de ce genre n'ont pas été décelés et, même s'ils ont existé, ils ont été assez réduits et le temps a certainement effacé leurs traces.

Par contre, *l'antiquité* et le *haut moyen âge* ont laissé des traces appréciables de l'action de modelage exercée par l'homme, surtout en ce qui concerne le relief et le sol. Ainsi, sur environ 1/4 de la surface du sol roumain, se trouve un relief anthropique formé de quelques milliers de monticules, hauts de 1 à 20 m. Ils sont situés à des endroits élevés, ligne de partage des eaux, périphérie de terrasses fluviales, et sont répandus dans la Plaine du Danube, le Plateau de la Moldavie et celui de la Dobrogea. Groupés selon des systèmes dont on ignore le sens, ces monticules appelés aussi « gorgane » ont été au début des objectifs funéraires, mais il est probable qu'ils avaient aussi un caractère de borne entre les propriétés. Ils semblent dater des années 1000 a.n.è. et 1000 n.è. C'est toujours dans les régions de plaine, ou dans celles de contact entre les collines et la plaine, qu'on rencontre les *vagues* de défense, maintes fois considérées comme étant d'origine romaine. Elles ont des dimensions appréciables (environ 60 km de longueur) en Dobrogea, une hauteur remarquable et un large fossé devant elles. Il faut citer la « vague » de Traian dans la Dobrogea, celle du sud de la Moldavie, ainsi que celle

d'Olténie (appelée *Brazda lui Novac*) et, probablement, les vagues qui se trouvent à l'ouest des Monts Apuseni.

Les vagues constituent un important modelage des terrains dans les hautes zones ou dans celles de plaine. Constituées dans un but de défense ou peut-être comme limite entre des possessions différentes, elles apportent au paysage respectif d'impressionnantes modifications, si l'on songe aux procédés techniques rudimentaires qui ont servi à leur réalisation.

Dans une grande mesure, l'aménagement du relief de haute montagne afin d'y construire des forteresses constitue, lui aussi, une action de modelage du relief par l'homme. Celle-ci apparaît dans les régions montagneuses, surtout dans les Carpates Méridionales, où les forteresses daces ont été érigées sur des plate-formes naturelles ou sur des cimes isolées qui ont été aplaties à cette fin avec la main.

Au cours du *moyen-âge*, après le XIV^{ème} siècle, c'est-à-dire après la consolidation des premiers Etats roumains, le caractère physique géographique du territoire commence à subir d'importantes modifications. Le développement de l'agriculture entraîne de massifs déboisements. Alors que pendant l'antiquité la plus grande partie du territoire était recouverte de forêts, au Moyen âge celles-ci ont subi des coupes continues et progressives, au commencement les forêts de chênes et, ensuite, celles de hêtres. On a supprimé d'abord les forêts de la Plaine du Danube (à l'ouest du Bărăgan) et de la Plaine de la Tisa en créant une zone de silvosteppe qui existe encore de nos jours.

Au moyen âge les paysans qui taillaient une clairière dans la forêt, ou bien la réalisaient par le feu, devenaient propriétaires du terrain ainsi déboisé. Le bois qui en résultait, lorsqu'il n'était pas brûlé, servait à la construction des habitations ou des communs et on plantait sur le terrain ainsi obtenu des vignes, des vergers, ou bien il était utilisé comme pâturage ou site de village. Les villages éparpillés des Subcarpatès, des plateaux ou des collines ont tous cette origine. De tous les facteurs naturels, la végétation est celle qui a subi de grandes modifications, en commençant par la forêt : alors qu'au début de notre ère presque 75 % du territoire était recouvert de forêts (environ 180 000 km²), au XIX^{ème} siècle la forêt ne détenait plus que 50 % et de nos jours 26 % de notre territoire est encore forestier.

En ce qui concerne les modifications de relief, au moyen âge ont apparu des terrasses (agroterrasses), grâce au labourage répété des versants, surtout dans le centre de la Transylvanie (sur la vallée du Mureș) et dans les Monts Apuseni.

À l'époque moderne, le XIX^{ème} siècle a été décisif du point de vue de la modification du milieu physique roumain, surtout en ce qui concerne le déboisement continu, le défrichement de la steppe et sa transformation en terrain agricole. Jusqu'alors, la steppe avait été utilisée pour le pâturage des moutons et des bovidés, parfois même en hiver. La végétation spontanée de la steppe, haute, en grande partie herbeuse, était parcourue par les chasseurs qui traversaient cette broussaille à cheval à la recherche des lièvres et des outardes — gibier typique de steppe. Source d'inspiration pour les grands conteurs, tels que Al. Odobescu chez les Roumains et N. Gogol chez les Russes, la steppe a été rapidement transformée par la charrue, surtout après le traité d'Andrinople

(1829). La défaite ottomane a consacré la liberté de navigation sur la mer Noire et le Danube et a permis l'intensification de l'exportation du blé dont le besoin se faisait sentir sur les marchés de l'Europe occidentale à cette époque de développement industriel. Ceci a conduit au défrichement de la Dobrogea, du Bărăgan et de la Mostiștea ainsi qu'à celui d'autres steppes de la plaine Roumaine du Danube, riche en tchernozioms particulièrement fertiles pour le blé.

On a constaté que tandis que la surface des forêts a été réduite de 75 % du territoire roumain à seulement 26 % au cours de deux millénaires, la steppe a été défrichée presque au cours d'un seul siècle ; parallèlement à l'introduction des labours, de notables changements ont eu lieu dans la géographie de l'habitat, de la population et des voies de communication ; ainsi, un paysage nouveau a été créé.

Il faut mentionner aussi quelques *changements annexes* de milieu qui ont eu lieu en même temps que l'introduction de l'agriculture moderne, le défrichement massif de la steppe et les commencements de l'industrie. Il s'agit de l'activation des dunes de sables d'Olténie et du Bărăgan, lesquelles sont devenues mobiles dans une grande mesure par le déboisement et l'intensification du pâturage ; pour les fixer, on a fait des plantations massives d'accacia (environ 40 000 ha), surtout dans les parties élevées, ce qui a permis l'extinction des foyers de dispersion du sable. En second lieu, le paysage a subi des modifications négatives, surtout dans les Subcarpates et certaines parties du plateau ; ici, comme effet des déboisements inconsidérés et de l'exploitation agricole des terrains en pente, des érosions du sol ont eu lieu, ainsi que des glissements et même des dégradations massives de terrain. Le colmatage des vallées, résultat de l'accumulation due à l'érosion des versants cultivés, a eu pour effet l'installation des inondations dans les vallées de la plaine de la Tisa et dans certaines vallées de la plaine Roumaine. Cette situation s'est produite au XIX^{ème} siècle et dans les premières décennies de notre siècle.

Les modifications de milieu des décennies V—VIII du siècle actuel sont particulièrement importantes et ont conduit à une transformation radicale des paysages de Roumanie.

On a endigué la plaine inondable du Danube et ainsi environ un demi million de ha sont entrés dans le circuit agricole. A cette occasion, en évitant les débordements annuels, les lacs ont disparu et, par contre, des centres piscicoles nouveaux d'un grand rendement ont été créés. Les roseaux ont été supprimés et les forêts de prairie ont été coupées ; on a aménagé, pour les cultures irriguées, environ un million de ha, dans la plaine du Danube en premier lieu. La surface du terrain est maintenant traversée de canaux d'adduction et d'arrosage, et le terrain a été nivelé, ce qui en a modifié la topographie ; le réseau hydrographique artificiel a été étendu, l'humidité relative de l'air en a été accrue et les sables mouvants ont été fixés. Au cours de l'actuel plan quinquennal la surface aménagée atteindra plus de 3 millions de ha.

Dans la plaine du Danube et dans celle de la Tisa, des régions inondables ou bien ayant parfois un excès d'eau ont été desséchées. Celles-ci dépassent actuellement un million de ha.

De nombreux lacs d'accumulation ont été créés, dans des buts énergétiques, piscicoles, d'alimentation ; les plus importants sont celui

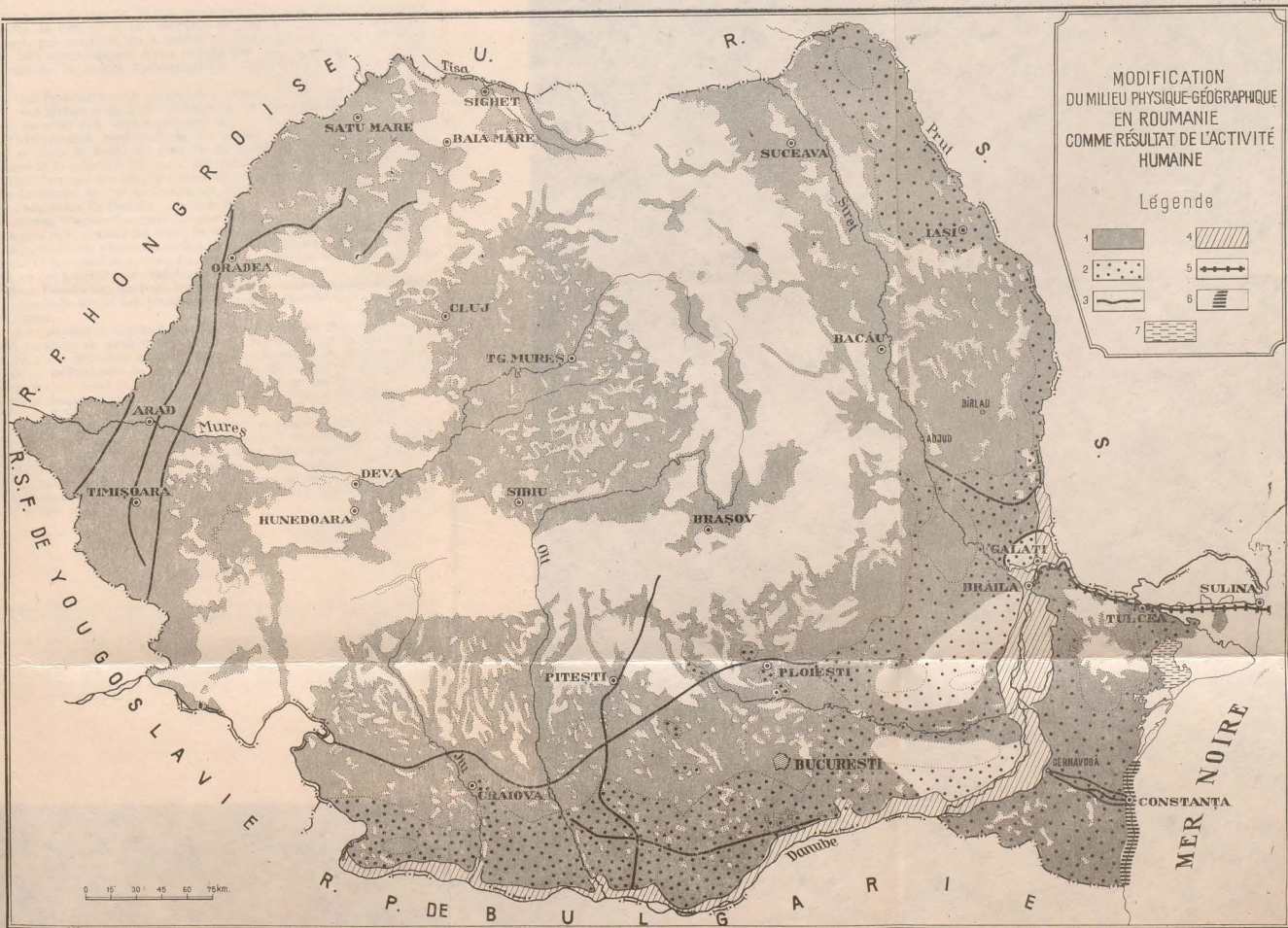


Fig. 1. — Modification du milieu physique-géographique en Roumanie comme résultat de l'activité humaine.

1. Terrains défrichés pendant les deux millénaires de notre ère; 2. relief anthropique né pendant l'intervalle compris entre les années 1200 avant notre ère et 1000 de notre ère; 3. épave de terrain (valée) : anciennes lignes de fortification construites dans les pays de plaines; 4. terrains endigués dans la plaine alluviale;

5. Aménagements portuaires, consolidations de falaises et plages artificielles sur le littoral de la mer Noire effectués pendant le XXe siècle; 6. Aménagements pour l'irrigation (XXe siècle); 7. Aménagements pour l'irrigation (XXe siècle).

de Bistrița, long de plus de 30 km, et celui du Danube, derrière le barrage des Portes de Fer, qui a une longueur de plus de 100 km. En Moldavie seulement, par exemple, on a réalisé au cours de la dernière décennie environ 300 accumulations d'eau le long des rivières, ce qui a sensiblement modifié le réseau hydrographique ainsi que l'humidité relative de l'air.

Il faut également rappeler les reboisements qui ont totalisé, de 1950 à 1970, une surface d'environ 1 350 000 ha, ce qui a permis de maintenir le fonds forestier aux mêmes proportions.

D'importantes modifications du milieu ont eu lieu le long du littoral et dans le Delta du Danube au cours du dernier siècle. Nous mentionnons la création du canal de Sulina et les aménagements faits sur le Danube maritime (depuis son embouchure jusqu'à Brăila), la réduction de la salinité du lac de Razim par la création de canaux qui apportent de l'eau douce du Danube — pour la pisciculture et pour les irrigations, — les travaux d'agrandissement du port de Constanța, lesquels ont exigé un immense déplacement de terre, la création de plages artificielles destinées à agrandir les plages naturelles et à développer le tourisme, l'aménagement et la consolidation des falaises de Constantza et des stations du littoral, ce qui a freiné leur évolution naturelle rapide.

Dans l'ensemble, on peut conclure que le milieu physique géographique roumain actuel est presque entièrement modifié par rapport au milieu initial.

La végétation naturelle a subi les changements les plus importants : la forêt, au cours de deux millénaires a été réduite à 1/3 de sa surface ; la steppe a été défrichée au XIX^{ème} siècle ; la plaine du Danube a été endiguée et débarrassée de roseaux au cours de la VII^{ème} décennie de notre siècle ; le littoral de la mer Noire a été aménagé au cours du dernier siècle et la dessiccation des basses prairies de la Tisa a été réalisée aux XIX^{ème} et XX^{ème} siècles.

Les plus grands changements du milieu physique ont eu lieu dans le dernier quart de siècle ; ils concernent la majorité du territoire roumain et comptent de grands travaux d'améliorations foncières, la lutte contre l'érosion, les aménagements hydrotechniques, les reboisements, etc.

Les modifications apportées par l'homme au milieu géographique en Roumanie, au cours de l'histoire, ont eu pour effet la réduction du milieu naturel à une petite surface.

Reçu le 11 janvier 1972

Chaire de géographie
Université de Craiova

BIBLIOGRAPHIE

- NICOLAE CEAUȘESCU (1969), *Rapport présenté au X^{ème} Congrès du P.C.R. Ed. politică. Bucarest.*
 V. MIHĂILESCU (1969), *Changements dans le paysage géographique de notre patrie au cours des derniers 25 ans, Terra, 4.*
 N. AL. RĂDULESCU (1967), *Modification dans le paysage géographique de la République Socialiste de Roumanie, Mélanges de géographie offerts à M. Omer Tulippe, I, Liège.*
 — (1968), *Le développement de l'agriculture dans les années de puissance populaire et les modifications apportées au paysage géographique, Natura, 2.*
 — (1969), *Recherches de géographie humaine à l'aide du relief anthropique, Comunicări de geografie, VIII.*

THE AGRICULTURAL CAPACITY OF TERRITORIES ASSESSED BY THE COMPONENTS OF THE GEOGRAPHICAL LANDSCAPE

by T. MORARIU, I. MAC and I. CRIȘAN

Producția vegetală a unui teritoriu este condiționată de un complex de factori naturali și tehnico-economici. Factorii naturali se impun prin determinarea unei capacități potențiale agricole a terenurilor, a cărei valorificare se face în mod diferențiat în funcție de *aptitudinea* de utilizare a teritoriilor. Stabilirea acestei aptitudini se face printr-un proces de analiză și sinteză geografică care urmărește separarea unităților de peisaj omogene ca structură, funcționalitate și fizionomie. Urmărindu-se apoi asocierea fizico-geografică-ecologică se ajunge la precizarea tipurilor agro-staționale, care se pretează la un anumit mod de amenajare și exploatare agricolă. Astfel, componentele peisajului geografic înlesnesc stabilirea aptitudinii agricole a teritoriilor prin facilitarea separării unităților de peisaj, omogene, în primul rând, și, prin informațiile pe care le conțin și care, concretizate în indici, sint necesare la depistarea tipurilor agro-staționale, în al doilea rând. Prin tip agro-stațional se înțelege o suprafață teritorială omogenă din punct de vedere fizico-geografic (sinonimă fiziotopului sau biotopului), ecologic și productiv, având aceeași aptitudine de utilizare și necesitând măsuri și lucrări identice de amenajare și ameliorare.

În stabilirea aptitudinii agricole a teritoriilor, componentele peisajului geografic se impun diferit și își schimbă funcția în raport cu ierarhizarea tipologică a diverselor unități teritoriale.

Concepția de mai sus este exemplificată prin depistarea tipurilor agro-staționale din împrejurimile localității Cluj.

Developments in physical geography during the past ten years have had a twofold consequence for the present evolution of this science, namely, more theoretical research into the geographical landscape and more practical investigation in regional geography.

Looking upon the complex cover of the earth (regardless of its denomination) as a material system having a certain specific structure, dynamics and territorial differentiation, associating all conditions imperative to the development of life, geography is called upon not only to outline the concrete territorial units of this cover but also to specify the most

appropriate forms to turn these regions to account in terms of the capacity of the latter.

To cope with this task geographical research is directed toward analysing the landscape components and structure and toward delimiting various-order geographical regions.

The components of the geographical landscape, whether taken apart (lithology, relief, climate, water, soil, vegetation, etc.) or associated into complex forms (substrate, community, environment or abiotic, biotic and anthropic — Paffen, 1953) have a twofold particularity: as regards quantity they are a source of information which by analyses provides indicators for geographical syntheses or practical determinations; as regards quality, they are a basic factor in establishing the type of landscape.

These two essential attributes of components may help differentiate various-order geographical regions. For instance, the qualitative values of climatic factors should be sought in the terrestrial and extra-terrestrial processes involving wide surface areas and eventually shaping out the character of large geographical regions. Further, in terms of the relations ultimately established between the geographical components and in the terms of the type of energy-exchange of processes taking place differently against the background of large regions, subordinate regions can be established in hierarchical succession down to the lowest-order space units marked out at present by different labels (biotope, ecotope, geotope, physiotope, etc.).

Each region, regardless of magnitude, has a certain potential utilization capacity in terms of its consistency and physionomy. It is the task of many specialists to put a region to the best of uses, each fulfilling it according to the particularities of research in his field. In our opinion, a region can be turned to account at any level of the geographical cover, that is macroregions, mesoregions or microregions, but one should always bear in mind what is aimed at so that work be carried out at the appropriate level.

To facilitate the task of specialists in various fields and to make geography more accessible to practice, research should not aim solely at geographical studies proper but look into various economic fields as well.

We assume, therefore, that in determining the agricultural capacity of territories, the aptitude of the components of the geographical landscape and the concrete resultant of their action, i.e. geographical region, are neither uniform nor unitary at any level of work. Thus, to outline Romania's agricultural zones with specific utilization capacities one must look for the type of landscape in which the tectogenetic relief (the Carpathian and the sub-Carpathian relief, the platforms east and south of the Carpathians and the volcanic relief) and its corresponding climate represent the determining factor.

A logical correspondence is noticed between the magnitude of determined geographical regions, that is between the indicators as a whole which establish them, and the rank of agrostational units. The deeper the geographical analysis goes, the lower the aptitude of the component as a whole (relief, climate, water, air, soil etc.), in favour of the constituent elements (elementary relief forms, slope, cover deposit, temperature, humidity, chemical composition, etc.). It is at the elementary level that

the most important substance changes and energy transformations take place. These elements do not exist separately because a permanent exchange of substance and energy is going on among them so that parts of the substance of one element go to make up the other elements and a certain form of energy passes into another one (Grigoriev, 1962). These dynamic and highly complex processes do not develop throughout the geographical cover or in higher-order regions but at the level of the lowest-order space complex viz, the physiotope or ecotope.

To determine the agricultural capacity of rather restricted surface areas it is necessary to resort to elementary territorial complexes which are the material carriers of transformations and represent essential functional units. Since each physiotope is delimited by features specific to its constituent parts, by a special exchange relation among its components, and by a certain capacity of transfer or exchange, it means that it has a real utilization capacity.

An attempt to assess the utilization capacity of this potential productive aptitude, by resorting to the pedoecologic factor, that is to estimate land use and the most appropriate cultures means to establish the agrostational types. In this way the components outlining a certain physiotope indirectly express their capability to determine the agricultural capacity of territories.

A region's utilization capacity in establishing the agrostational types can be assessed also by means of some indicators of quantity and quality.

The value of these indicators is estimated by the weight and role of the elements of landscape. There are many categories of indicators of landscape components, but to characterize basic and functional geographical units and agrostational types the following should be primarily considered :

- indicators of the relief (which are simple, complex and specific) outlining each portion of the respective relief : slope, surface orientation, altitude, horizontal and vertical fragmentation, the length and width of the respective form, roughness coefficient, mechanical make-up and structure of the respective form, etc. ;

- indicators of climate outlining the topoclimatic features of places : temperature at the surface and in the soil, air-mass dynamics and humidity in respect to pressure variation ;

- indicators of soil properties and the component derived from the substrate-relief-climate ratio involve : composition, reaction, structure, texture ; ecological condition : trophicity, humidity, aeration, consistency ; fertility ; the contents of utilizable organic and inorganic matter, etc. ;

- indicators of the biotic component : biotic mass, space density, incidence and prevalence, etc.

Quantitative indicators may be correlatively plotted on graphs, profile cross sections (Fig. 1) or even on special geographical charts or charts estimating the actual utilization capacities (Fig. 2).

Quantitative estimations aimed at the territorial agricultural domain should always be made at a very detailed scale so that the agrostational types could be singled out.

FELEAC-SOMEȘENI - VALEA CALDĂ

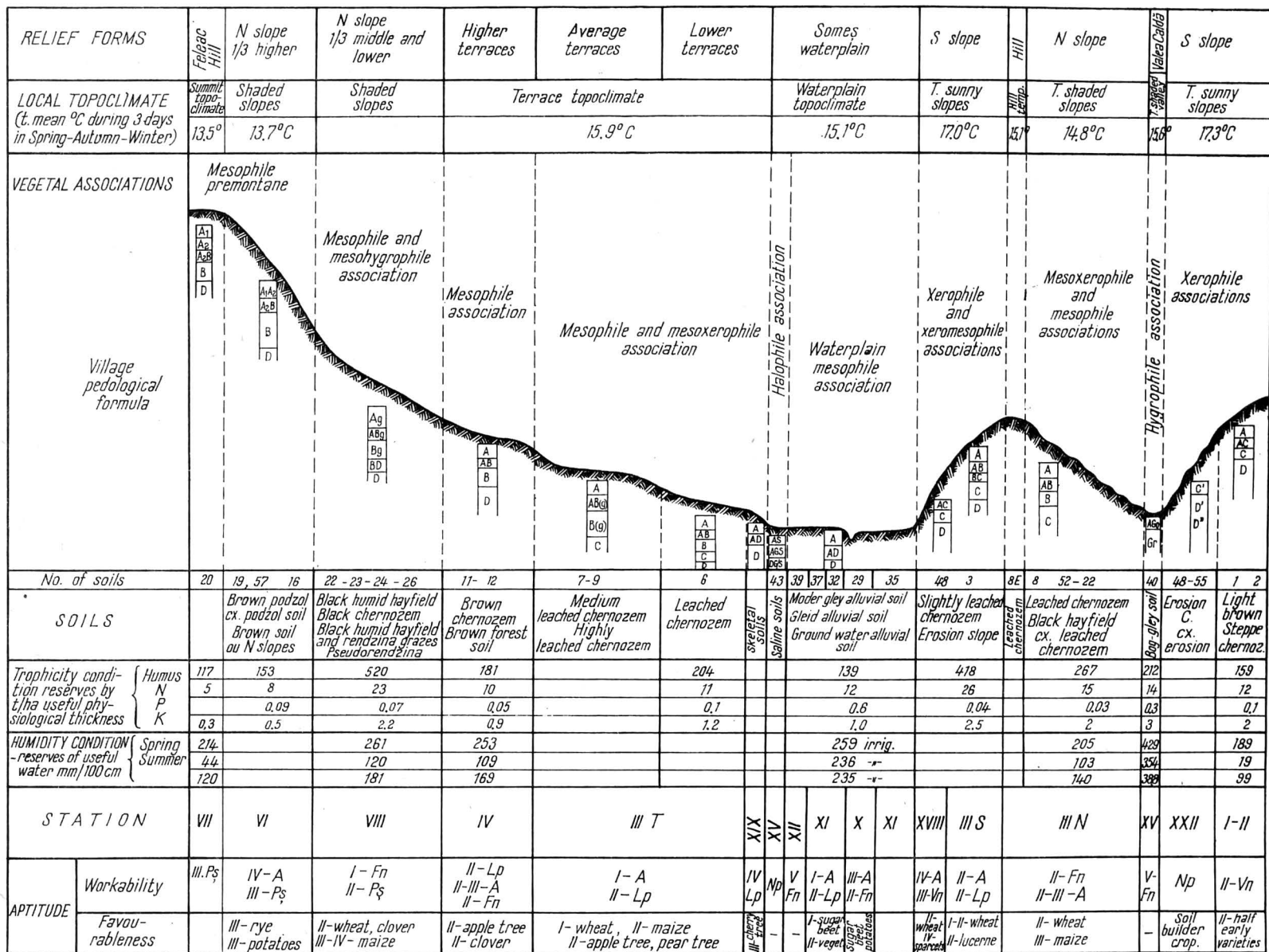


Fig. 1. — Geographical and agrostational cross section (S—N) of the Feleac — Someșeni — Valea Caldă region. Length scale 1 : 275,000 ; height scale 1 : 30,000,
<https://biblioteca-digitala.ro/> <http://rjgeo.ro>

FELEAC-SOMEȘENI - VALEA CALDĂ

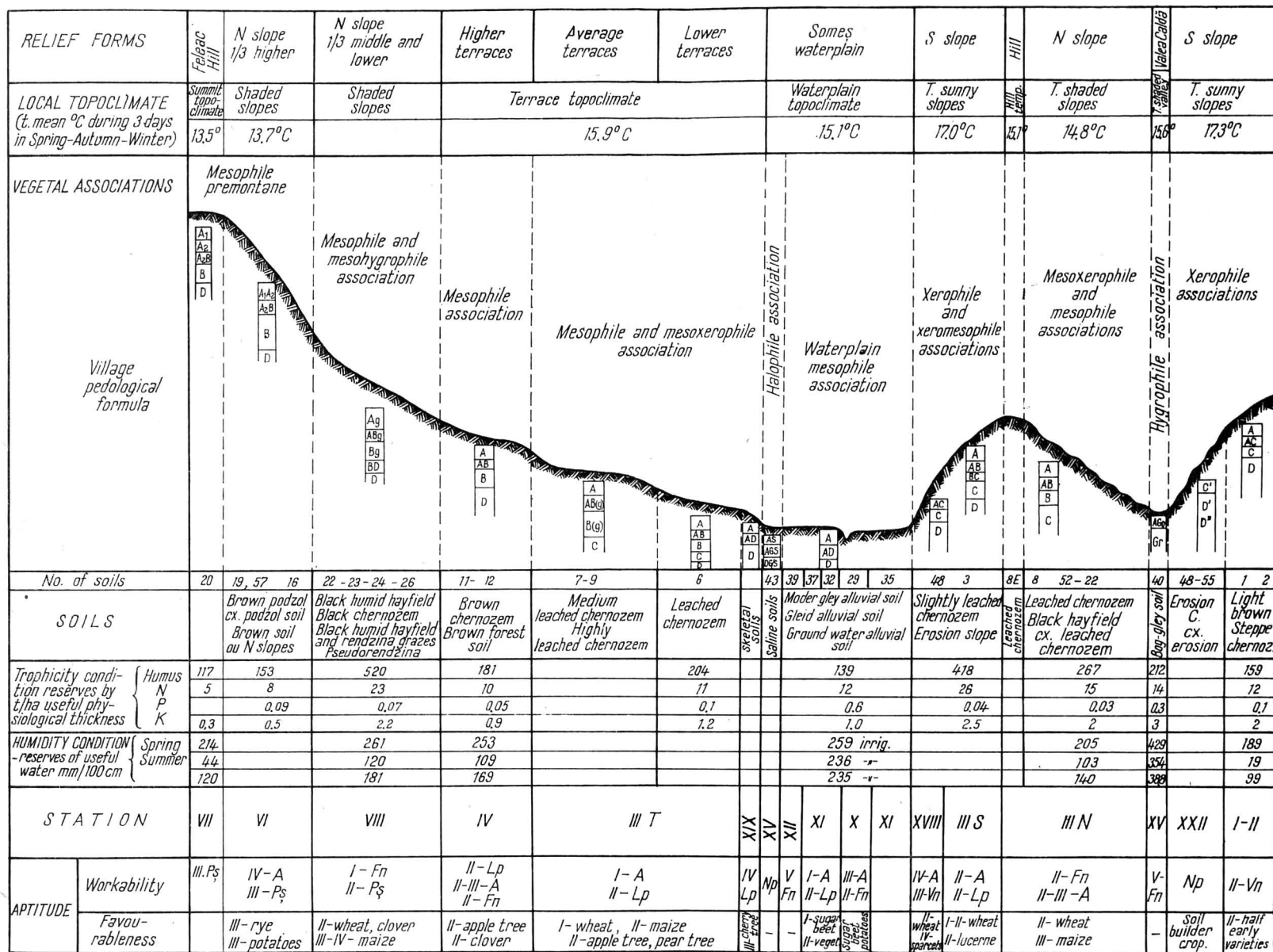


Fig. 1. — Geographical and agrostational cross section (S—N) of the Feleac — Someșeni—Valea Caldă region. Length scale 1 : 275,000 ; height scale 1 : 30,000,
<https://biblioteca-digitala.ro> / <http://rjgeo.ro>

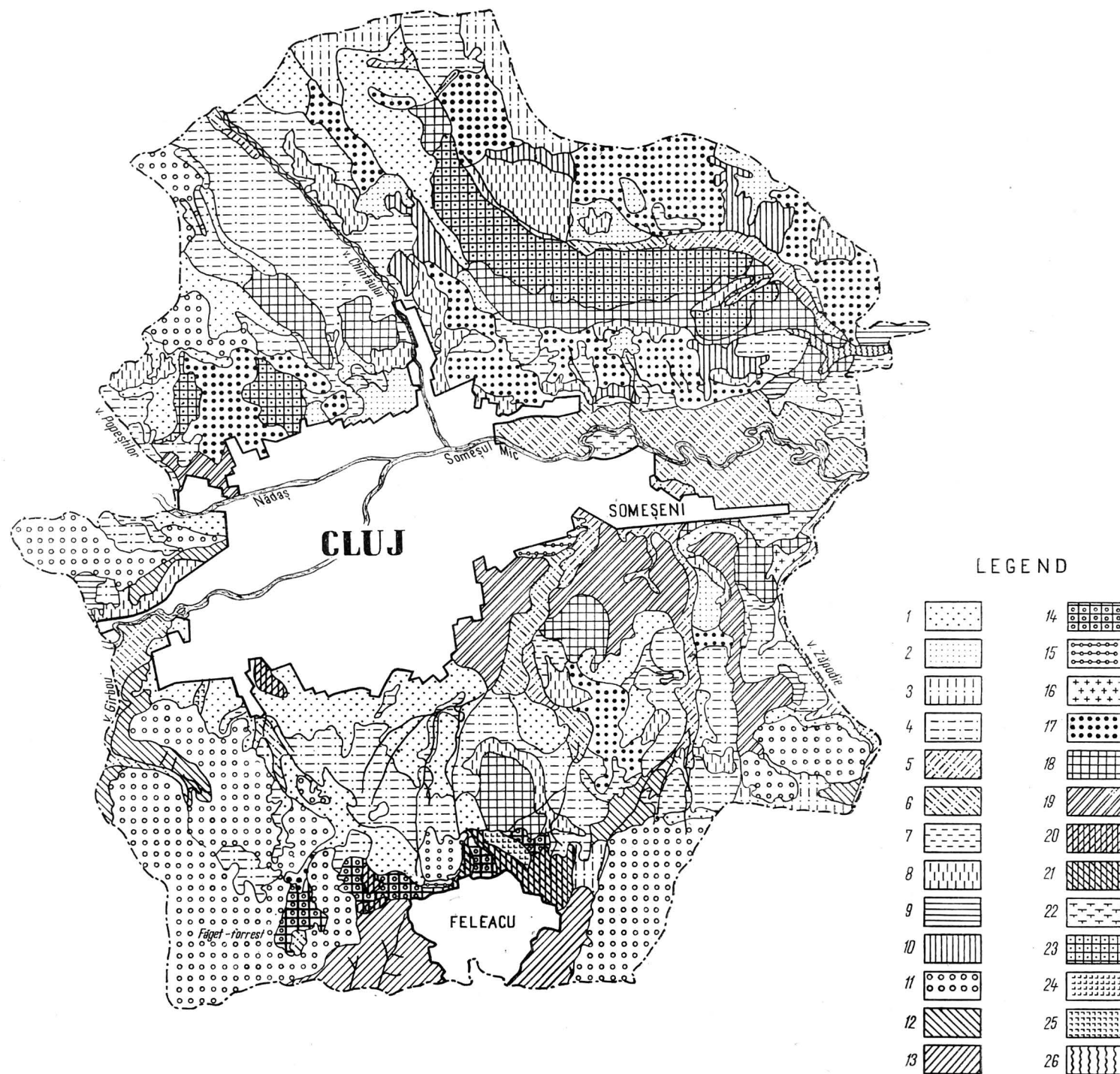


Fig. 2. — Map of agrostational types. Surroundings of the town of Cluj.

1. Shaded slopes and upper terraces with brown forest soils; workability: grade II; favourableness: grade II. 2. Moderate grounds, sharply dipping sunny slopes with partially eroded silty chernozems; workability: grade II vineyards; grade III arable lands and orchards, grade IV grazes; favourableness: grade II fodder plants, grade III wheat and maize. 3. Windy tableland with imperfectly drained acid brown forest soils; workability: grade III arable lands; favourableness: grade II. 4. Shaded and intermediate slopes with brown hayfields and leached pseudo-rendzina; workability: hayfields, arable land and orchard; favourableness: grade II wheat, grade III apple-trees, grade IV maize; it requires water catchment, drainage and local levelling. 5. Humid old narrow valleys with low winter temperatures and heat in summer, lacovishte, moder-gleys and salty soils requiring special planning. 6. Central terraced waterplain affected by hoar-frost with alluvial and chernozem soils, at times, ground water podzol, and dank, pervious and well aerated; workability: grade I-II wheat, sugar beet and vegetables. 7. Greatly dipping, sunny, convex slopes with alkaline carbonated soils, strongly eroded; workability: vineyard, orchards, sainfoins. 8. Sunny slopes with chernozems, pseudo-rendzina and erosions; workability: grazes and orchards. 9. Strongly dipping sunny slopes with excessively drained light brown steppe soils dominated by xerophyte grazes, grade V; workability: grade II vineyards, requires anti-erosion works and soil water retention. 10. Degraded grounds through old landslides (glimee), require fixation by afforestation works, especially black pine plantations. 11. A forested grounds. 12. Strongly deeping steep slopes, sunny and warm, greatly degraded, with marl-chalky rendzina, very little humidity; workability: grade IV grazes regenerated with *Onobrichis* and *Bromus*, grade IV vineyards through subsidence, but especially for protection plantation. 13. The Feleac Hill with a cold, windy climate, spring comes late, podzol and sandy-podzol soils, highly permeated and acid, poor and nonstructurable; workability: grade III grazes, requires amendments and fertilizers. 14. Shaded, cold, slightly sloping grounds, with brown podzol and brown pseudo-gleyed soils, very humid in spring; workability: grade IV arable lands and grade III grazes; favourableness: grade III cereals. 15. Sloping microdepressions with layer springs and bog-gley soils, insufficiently aerated, hydrophile vegetation, requires catchment and orientation of springs by planting *Salix* sp. 16. Terrace fronts with brown skeletal, clayey soils, excessively drained; workability: grade V grazes and grade IV orchards. 17. Sunny slopes with leached chernozems. 18. Shaded sloping grounds with silty and argillaceous chernozems. 19. Terraces with leached chernozems, silty and argillaceous soils; workability of types 17, 18, and 19: grade I-II arable land, grade II orchards, grade III grazes; favourableness: grade I-II wheat, grade II maize and clover, grade III potatoes. 20. Strongly dipping slopes with highly eroded, silty soils, poor in humus, nitrogen and phosphorus; workability: grade IV arable land, grade III orchards, requires complex antierosional works. 21. Shaded slopes with landslides in the areal of podzol, and podzol silty acid soils; workability: grade IV grazes and local protection plantations. 22. Riverplain, often flooded, with alluvia and layered alluvial soils; workability: grade III arable land. 23. Sliding shaded slopes with leached chernozem, brown hayfields and stagnant gleyed soils; workability: grade II-III hayfields and arable land. 24. Active and stabilized gully erosional grounds, requires melioration. 25. Salty ground with chloride residual saline soils, requires special melioration works. 26. Various located highly alkaline and argillaceous soils, insufficiently aerated; workability: grade V grazes on the slopes and grade V arable land in the waterplain.

Note. Grade of workability: I — very good, II — good, III — average, IV — weak, V — very weak. Grade of favourableness: I — highly favourable, II — favourable, III — average favourable, IV — slightly favourable, V — quite unfavourable.

— the aptitude of the components of the geographical landscape to determine the agricultural capacity of territories is therefore reflected indirectly by favouring the differentiation of landscape units and directly by providing specialists with indicators for developing land use procedures. The aptitude of the various components is differently felt; it also changes in terms of the typological hierarchization of various territorial units.

REFERENCES

1. CHIRIȚĂ C. et al. (1964), *Fundamentele naturalistice și metodologice ale tipologiei și cartării staționale forestiere*. Ed. Academiei, Bucharest.
2. CRIȘAN I. (1965), *Cercetarea și cartarea solurilor la scări mari în regiunea Cluj*. Șt. Sol., 3.
3. MORARIU T., MAC I. (1967), *Regionarea geomorfologică a teritoriului orașului Cluj și împrejurimilor*. In: "Studia Univ. Babeș-Bolyai" Ser. Geol.-Geogr., 1, Cluj.
4. GRUMĂZESCU H., (1966), *Regiunea geografică și utilizarea terenurilor*. Șt. Cerc. Geol., Geof. Geogr., Ser. Geogr., XIII, 1.
5. NEEF E. (1968), *Landschaftsforschung. Beiträge zur Theorie und Anwendung. Festschrift E. Neef*. VEB Hermann Haack, Gotha.
6. PAFEN K. (1953), *Die natürliche Landschaft und ihre räumliche Gliederung*, Forschungen 2. Deutsche Landeskunde, Remagen, 68.
7. GRIGORIEV A. A. (1962), *Fundamentele teoretice ale actualiei geografiei fizice*, Probl. filoz., 3.
8. NEEF E. (1965), *Elementaranalyse und Komplexanalyse in der Geographie*. Mitt. öst. geogr. Ges., 107.

Received January 4, 1972

*Department of Geography
The Section of the Academy of the
Socialist Republic of Romania
Cluj*

THE PROBLEM OF QUATERNARY PALEODELTAS IN ROMANIA

by N. POPP

Intensele mișcări crustale post-tectonice grefate pe zonele de contact altitudinar din relieful României concomitent cu mari variații climatice au provocat acumularea unor uriașe cantități de material detritic, dispus sub diferite forme (pionturi, terase, conuri de dejecție etc.) în principal la periferia externă și internă a spațiului carpatic.

Dintre acumulările cuaternare de acest fel, un interes deosebit îl prezintă, prin frecvența și dimensiunile lor, conurile-delte. Ca paleodelte, ele apar cu precădere în zonele de contact geomorfologic cu bruste și pronunțate denivelări, din vecinătatea ariilor de subsidență și a unor foste domenii lacustre.

România este un teritoriu geografic care întrunește condițiile optime pentru desfășurarea fenomenului deltaic și paleodeltaic, un teritoriu cu ample pionturi și zone piontane.

Cele mai importante zone de acest fel se întâlnesc pe fațada vestică a munților spre cimpia Tisei (depresiunea panonică) și pe fațada lor sudică și sudestică spre Cimpia Română (depresiunea moesică). Fenomenul se mai repetă, dar de dimensiuni mai reduse, pe fațada estică a Carpaților orientali spre valea Siretului. În depresiunile intramontane și în lungul văii Dunării.

Cimpia piontană a Tisei se caracterizează printr-o succesiune de largi evantaie de aluvionii vechi instalate la debușeu în cimpie al principalelor artere hidrografice : Someș, Crișuri, Mureș, Timiș. Aici se întâlnesc mai multe generații de delte, unele ca delte formate succesiv pe amplasamente diferite, ca la Mureș, altele ca delte suprapuse pe același amplasament, cu fosilizarea celor mai vechi, ca la Crișul Repede sau Timiș.

Întreaga bordură internă a Cimpiei Române este marcată de paleo-delte, fiecare cu specificul ei : unele rămase suspendate pe interfluvii, ca între Topolog și Argeș, altele ca delte poligenetice, născute în mai multe etape, ca pe Argeș la sud de Pitești, ori monogenetice, născute dintr-o dată, ca paleodelta Prahovei. Sint apoi paleodeltele de la curbura Carpaților spre Siretul inferior, între Râmnicu Sărat și Trotuș ; în fine, paleodeltele din vorlandul munților flișului pînă la Rădăuți, cu delte îngemănate și apoi parazitare de conuri de dejecție. Mici ca dimensiuni, dar interesante, sint conurile-delte din depresiunile Brașovului și Giurgheului. În fine sint cele două delte suprapuse ale Dunării la vărsare : delta actuală, holocenă și paleodelta rissiană, o deltă fosilă, dedesubt.

Paleodeltele cuaternare prezintă cel mai mare interes datorită faptului că sint mai bine conservate, deci pot fi mai ușor depistate. Ele apar în zone de pionturi

sau în imediata vecinătate a acestora. Depozite de tip deltaic se cunosc și din epoci geologice mai vechi, cum sint, între altele, cele de vîrstă sarmatică din zona piemontană a fîșului din valea Moldovei. În general, de cite ori au fost întrunite condiții favorabile dezvoltării unei delte, aceasta s-a putut forma; astfel de condiții au existat și în antecuatarnar, dar paleodeltele mai vechi decît cuaternarul se păstrează astăzi numai ca depozit, nu și ca formă de teren. În consecință nu se poate vorbi de paleodelte în înțeles geomorfologic decît numai în ceea ce privește paleodeltele pleistocene, începînd cu Villafranchianul.

INTRODUCTION

The characteristic feature of the geomorphological landscape of Romania, excepting Dobrogea, is constituted by two major relief planes: *an upper plane*, a mountain area, the Carpathians displaying an annular shape, and

a lower plane, represented by plateaus and plains at the foot of the two slopes of these mountains: inside the mountainous ring and outside it.

The deleveling between these two relief planes is of the order of 500 — 1,000 m.

This major structure of the relief was broadly built up already by the end of the Pliocene. During the last geological interval, the Upper Pliocene-Quaternary, there occurred some modifications generated by multiple causes which, however, have preserved or even amplified the deleveling existing between these two relief planes. Among these causes the most important were:

1. intense crustal posttectonical uplift movements in the mountain area, and descent within that located in the Carpathians
2. strong climatic variations.

These causes developed on relief altitude contrasts have provoked an immediate result, large denudations, and respectively accumulations which led to the present-day aspect of the relief.

This situation accounts for the presence of huge amounts of detrital material laid down under various forms in all zones showing a break of slope, and mainly at the contact between mountains and zones with a more dipping relief.

The following categories of detrital accumulation forms are to be noted:

- a) bedded piedmont slopes and piedmonts;
- b) fluvial or fluvio-lacustrine terraces and flood plains;
- c) detrital fans and deltas.

All these forms either frequently encountered or extended over large areas constitute one of the main characteristic features of the present-day geomorphological relief, and namely: Quaternary accumulations related to the Carpathian Domain.

Among the Quaternary accumulations, the detrital fans and paleo-deltas, whose presence is connected with and explained by paleoclimatic

variations of the Pleistocene, and the active tectonics of the Carpathian regions, are of a peculiar interest owing to their frequency and sizes. Occasionally the unfolding of the piedmont-fan-delta transition is imperceptibly carried out by the repeated reworkings of the existing material, and also by continuous accumulations of the new material.

The most important deltaic areas are met in Pericarpathian Zones, particularly along the western front of the Carpathians, towards the Tisa Plain (Pannonian Depression), and also along the south-eastern one, towards the Romanian Plain (Moesian Depression), generally on axes of the maximum subsidence.

A special case is constituted by the paleodeltas and the present-day delta of the Danube; the paleodeltas formed along the border of the Transylvanian Depression and of the Moldavian Plateau present peculiar cases.

The fact that the geographical territory of Romania is characterized by a large-scale area of piedmonts — as revealed by the above-mentioned conditions — accounts for the essential signification of the paleodeltaic phenomenon within the Carpathian and especially Pericarpathian hydrographical network.

A precision is, however, required: although the accumulation piedmonts as such are encountered at a break of slope in a zone of morphological contact, and are built up during their formation of successive twinings of detrital fans, and from deltaic deposits, nevertheless a paleodelta is forming at the mouth of a valley either due to an important transport of solid flow, or owing to a reworking of some piedmont deposits. The piedmont is, in general, connected with an inclined plane along a deleveling, whereas the paleodelta — with the mouth of a valley.

PALEODELTAS FROM THE INNER BORDER OF THE TISA PLAIN

The whole eastern border of the large Pannonian Plain, respectively the Tisa Plain, is characterized by a succession of high fields (association of flattened terraces) and low fields (associations of flood plains common to several rivers). Where these high or low fields coincide with the mouths of the main Carpathian rivers they are covered by large fans of alluvia from small gravel to fine sand corresponding to some fan-deltas. The latter advanced according to the shore of the Pannonian Lake which marked a continuous retreat westwards up to its filling and its silting and complete desiccation. Over the high fields, at the mountain foot, there occurred Pleistocene deltas formed during the Villafranchian-Rissian interval inclusively, and over the low fields — Würmian and postglacial fan-deltas. All these old deltas may be identified only on the basis of drillings, according to the nature and arrangement of material and diverging aspect of the hydrographic network developed on them. The form of delta as such has vanished owing to the subsequent modelling of the relief developed on friable deposits, and also due to loess-like deposits and eolian sands.

Every main river — and that is the case for the Someş, Criş, Mureş and Timiş rivers — forms several generations of deltas, but each younger delta is located downstream with respect to the previous delta.

The dating of formations of deltaic type has been made paleontologically, by examining mollusca and fossil mammals, every time it proved possible.

Owing to the fact that to the four fluvial systems mentioned above is corresponding the same number of deltaic systems, and that each deltaic system consists of three successive deltas identified both petrographically and hydrogeographically, the conclusion is reached that starting with the Middle Pleistocene up to nowadays, the Tisa Plain has undergone three phases of climatic variations, and more active vertical crustal movements.

The most complex deltaic system tallies with the most important tributary of the Tisa river : the Mureş with its three successive deltas situated at the issue from the mountain at Lipova, the oldest delta (Rissian/Würmian) south of Arad, and the youngest one, the fan-delta (postglacial) at the river mouth of the Tisa that is turned about it by a wide bend (Szeged).

The intermediary delta as to its age is the single one which is to be found north of the present-day Mureş.

All these deltas may be recognized both by the nature of their deposits and the hydrographical divergent network settled on them.

PALEODELTAS OF THE INNER BORDER FROM THE ROMANIAN PLAIN AND OF THE FORELAND FROM THE EASTERN CARPATHIANS

Another zone of Romania, where the deltaic phenomenon could have developed, was located alongside the northern border of the Romanian Plain, i. e. also in a contact zone between mountains and an extended depression area. The whole Carpathian Foreland towards the Romanian Plain tallies with a zone of piedmonts whose formation has begun during the Villafranchian and continued up to the Holocene inclusively. This may be explained by the fact that in the course of the Quaternary period there have occurred abrupt movements, however uninterrupted, compensated by falling motions in the piedmont plain, accompanied by a repeated succession of climatic humid and arid epochs.

The simultaneous crustal movements, but in an opposite direction within the transition zone between mountains and plain, have marked an increased intensity west-eastwards reaching their maximum in the front of the South-Eastern Carpathian Bend along the northern border of the Romanian Plain where in a remote past an area of strong subsidence had developed (the Lower Siret). Here the maximum deleveling between hills and plain (about 1,000 m.) is encountered, as well as a maximum thickness of the Quaternary deposits (over 2,000 m.). This zone is likewise corresponding to the area from which the Romanian Plain Lake marked its latest retreat (by the end of the Pleistocene). It is along the piedmont zone, where an area of local subsidence is developing, that favourable premises are created for the building up of a deltaic system. This situation bears a clear-cut character only east of the Olt river, and namely in front of the issue in the plain of the main Carpathian rivers.

The Villafranchian with its warm-humid climate tallies with the phase of the strongest accumulations of gravels from the Foreland of the South-East Carpathians. These deposits reach their maximum thickness in the Carpathian Bend Zone between Dimbovița and Trotuș rivers. Outside the mentioned zone, the Villafranchian deposits display various aspects. Thus, west of the Dimbovița river they mark relatively small thicknesses, but cover extended areas, whereas north of the Trotuș river, the Villafranchian deposits (Cîndești gravels) are considerably reduced with respect both to their area and thickness.

On the outside border of the Subcarpathians, the Villafranchian forms a relief whose altitude exceeds 900 m. The same Villafranchian is buried in the subsidence zone of the Lower Siret at depths over 2,000 m. The accumulation of Carpathian fluvial gravels has also continued during the St. Prestian (Frătești gravels), their deposition extending south-eastwards, since they build up the bottom of the deltaic deposits. It is presumable that here they were laid down under the shape of a giant fan-delta which during the Günzian advanced beyond the present-day shoreline of the Black Sea.

As a result of the reworking of the Villafranchian deposits, several sequences of deltas were generated in the course of the Pleistocene. Most of them may be recognized when examining the nature of their component deposits and the hydrographic network developed on them. One of the oldest deltas, probably referable to St. Prestian since it has reworked the Villafranchian deposits, is located on the interfluvium between the Argeș and the Topolog rivers, west of Pitești.

The most remarkable detrital fan-delta from the border of the Moeșian Depression as to its sizes, is the Argeș paleodelta. It is extending south of Pitești under the shape of a fan which covers over 40 km., and is modelled in a system of five terraces, which from the Mindel up to the present, marks the same number of successive courses of the Argeș. In contrast with the Mureș whose three deltas have formed during successive phases, the Argeș extended its delta due to the slide on a single flank towards the direction of the retreat of the Romanian Plain Lake, and namely south-eastwards and eastwards.

A series of paleodeltas of some interest, but smaller and younger as compared with those of the Argeș because their age is not exceeding the Upper Pleistocene, have developed in front of the plain gulfs, which mark the exit of the main rivers from the Subcarpathians. These are : the paleodelta from the Țirgoviște Basin formed by the Dimbovița and Ialomița rivers, and a more important paleodelta from the Ploiești Basin of the same age, as a lower terrace (Würmian) at the entrance of the Prahova river into the plain.

A peculiar type of paleodeltas is encountered along the bend zone of the contact of the Subcarpathians with the Siret Plain, between Buzău and Trotuș rivers. Attracted by the axis of the maximum subsidence zone from the lower Siret, all rivers south of Focșani mark a bend northwards, so that the fan-deltas are to be found on the right bank (Buzău, Râmnic, Rimna), while north of Focșani they are advancing southwards (Milcov, Putna, Șușița). Fan-deltas display a rapid descent, as well as the fluvial terraces which become fossilized one under the other. The plane thus

inclined is overlying the ever younger downstream deposits. It is the most typical region where one accumulation form succeeds in an almost unobservable way to another: from piedmonts to piedmont slopes, terraces, detrital fans and deltas.

Into this series the Nicorești piedmont also falls with its deltaic deposits and fossilized terraces located between Siret and Birlad at the entrance of these rivers into the above-mentioned subsidence zone. After an interruption between Trotuș and Bistrița the deltaic phenomenon appears again along the East Carpathians-Subcarpathians and Moldova High-plain contact. Here, nearby the deposits of very old deltaic type (Sarmatian) from the entrance of the Bistrița river into the Subcarpathians (Buhuși), from Măgura Boiștei to Tg. Neamț, and from Ciungi, at the exit of the Moldova river of the mountains, there are recognized Würmian deposits of the deltaic type from the Rădăuți Depression with fans of the Suceava and Sucevița detrital fan-deltas. Owing to subsequent reworkings in the same region during the Holocene some smaller fan-deltas also occurred.

INTERCARCHIANS PALEODELTAS

Along the inner border of the Carpathians towards the Transylvania Plateau, as well as in the zone of Intracarpathanian fluviolacustrine depressions, paleodeltas are to be found. They are more characteristic of the Mureș river at its coming out from the narrow through the volcanic mountains (Deda), also of its tributary Gurghiu, but particularly of the Olt river.

The Transylvanian Olt is a river formed of sections. It crosses several Intracarpathanian Depressions which have been connected by successive captures. The transition of a depression to another one is made through gorges in eruptive formations. When coming out from each gorge the Olt forms a delta. The largest depression is the Brașov Depression, and it is the most indicative too for the following up of the paleodeltaic phenomenon. Even an inverted delta (Feldioara) with respect to the present-day water stream of the Olt is noticed here.

All these hinterland paleodeltas are developed exclusively in the subsidence zone, at the contact of surrounding mountains. The most extended Intracarpathanian Depression tallies with the Brașov Depression, the thickness of its Quaternary exceeding 300 m.; however, the most pronounced subsidences, showing a Quaternary up to 500 m. thick, are found along the Upper Mureș Valley, within the Giurgeu Depression and along the Upper Olt Valley in the Ciuc Depression.

Both in the Carpathians Hinterland and in the intramountain depressions, the fan-deltas are generally twinned, small-sized, displaying a clear-cut crossed structure generated by piedmont benchlands. Among the latter the piedmont benchland from the northern foot of the Făgăraș Alpine Massif and the paleodeltas from the Hațeg Depression are clearly outlined.

DELTAS AND PALEODELTAS ALONG THE DANUBE

In the Danube region two important paleodeltas may be dealt with : one of them presumable, large-sized at Turnu Severin at the issue of the river from the Iron Gate, and the other one, fossil, of more reduced sizes, in the upstream part of the present-day delta.

The Turnu Severin delta closed its activity as delta in the post-Villafranchian, when the Romanian Plain Lake retreated from its western part. The hydrographic network, arised on a freshly emerged land, displays various aspects in the Getic Piedmont Zone west of the Jiu river.

The other paleodelta of the Danube in the neighbourhood of the Black Sea is a delta originated in the Middle Pleistocene, as a result of the regression of the Uzunlar Sea. It was fossilized under the deposit of the Upper Pleistocene and of the present-day Danube Delta.

The recent delta has only been formed during the Holocene and consists of an upstream part overlying the Rissian paleodelta and a downstream fluvio-marine part. The deposits of the recent delta are thick (about 5 m.) and are composed, in the upstream part, of pelite-aleurites, at the bottom, of a layer of *Phragmites* peat 1 — 2 m. thick, and in the downstream part, of psammite-pelitic deposits.

The territory of the Danube Delta extending over an area of continuous subsidence has been affected in the course of the Pleistocene by four marine transgressions alternating with the same number of regressions. During the transgressive phases a marine arm has twice marked an advance in the northern part of Dobrogea beyond Brăila and the Lower Siret : the first time in the Mindel, as proved by the marine deposits of this age from Barboși, and the second time, in the post-Würmian, when the Paleo-Danube flowed in the sea upwards of Brăila, through a delta preserved inside the land, formed of two arms downwards of Hirșova. Subsequently, in a very short delay, the Romanian Plain Lake, reduced to a minimum area in the zone of the Lower Siret, vanished completely.

The fossil paleodelta, which is in fact the first delta of the Danube at the sea, has been formed in the time interval comprised between the paleoexine transgression in the Mindel, and the neoexine transgression, which had been the largest marine transgression occurred by the end of the Pleistocene. The silting of the marine arm from Brăila has rapidly unfolded during the post-glacial period, when the recent Danube Delta originated.

The entire present-day flow of the Danube, particularly from the Olt mouth downwards, is marked in front of the mouth of each tributary by a flattened delta-fan such as the Argeș, Mostiște, Călmățui rivers, and at the entrance of the Buzău in the Siret flood plain. They are the most recent deltas formed in the Lower Holocene.

The Argeș Delta-fan flowed over a delta-fan whose formation is presumably due to the Danube during the Rissian time, when the river did not advance any more downstream of Oltenița.

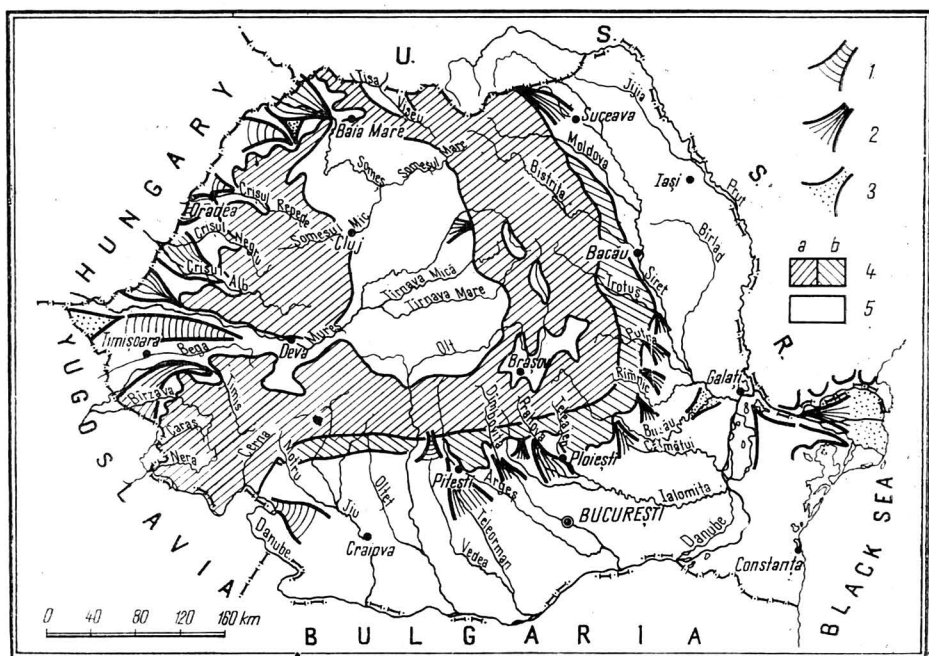


Fig. 1. — Romania: Area with paleodeltas

1, 2, 3, first, second and third generation; 4a, Carpathians Range area; 4b, Subcarpathians area; 5, Tablelands, depressions, plains,

CONCLUSIONS

The paleodelta phenomenon is very well represented over the territory of Romania. It is recorded in the category of strong fluviolacustrine accumulations from the Pericarpathian area beside other forms of this kind of accumulations such as piedmonts and piedmont slopes, terraces and flood plains which all constitute present-day forms, paleoforms or obvious fossil forms both from the geographical and paleogeographical points of view.

The deltaic phenomenon is connected with zones of geomorphologic contact, showing sudden and sharp delevelings, with areas of pronounced subsidence motions and with the vicinity of some lacustrine zones synchronous with the epochs marking the formation of deltas.

Over the same hydrographical channel several generations of deltas may be met, some of them as deltas successively formed on various emplacements, however close to each other, others as superposed deltas on the same emplacement but in different geological times; these are fossil deltas. Finally, there also exist polygenetical deltas i. e. the same deltas which were formed during a longer time interval, by repeated reworkings.

Irrespective of the type of the delta or the paleodelta, the complex cause of their formation is the break of slope at a geomorphological contact, which displayed crustal vertical movements in the opposite direction in the vicinity of a lacustrine or marine area.

REFERENCES

- ANDÓ M. (1970), *Geochronology and geomorphology of the Körös-Máros interfluvial plain*, Acta geographica, X, Szeged.
- BANDRABUR T., C. GHENEA, M. SÂNDULESCU, M. ȘTEFĂNESCU (1971), *România, harta neotectonică și text*, Atlas geol., foaia nr. 7.
- BARBU N., I. IONESI, B. IONESI (1964), *Masivul Ciungilor. Caracterizare geologică-geomorfologică*, An. șt. Univ. Cuza, geol.-geogr., X.
- COTET P. (1966), *Probleme de paleogeomorfologie în sectorul dunărean dintre T. Măgurele și Hirșova*, St. Cerc. Geol., Geofiz., Geogr., Seria geogr., XIII.
- DONISĂ I. (1968), *Geomorfologia văii Bistriței*, Ed. Academiei, Bucharest.
- GHENEA C., T. BANDRABUR, N. MIHĂILĂ, ANA GHENEA, P. GIURGEA (1971), *România, harta cuaternarului și text*, Atlas geol., foaia nr. 2.
- LITEANU E., C. GHENEA (1966), *Cuaternarul din România*, St. tehn. econ., seria H. 1.
- ORGHIIDAN N. (1969), *Văile transversale din România*, Ed. Academiei, Bucharest.
- POPP N. (1939), *Subcarpații dintre Dâmbovița și Prahova. Studiu geomorfologic*, St. Cerc. Geogr., III.
- (1969), *Les dépôts quaternaires et l'évolution géomorphologique des basses plaines de Roumanie*, VIII^e Congr. INQUA, Paris.
- POPP N., A. PRICĂJAN (1969), *L'origine des terrains fermes du Delta du Danube*, Bul. Soc. Șt. Geol., XI.
- POPP N., D. TEACI (1969), *Old deltas on the Romanian territory*, Symp. on the hydrol. of deltas, UNESCO, Bucharest.

Received December 14, 1971

Department of geography
Pedagogical Institute
Suceava

CASE HISTORY IN MODELLING LONGITUDINAL CROSS-SECTIONS IN THE CARPATHIAN AREA

by VALERIA VELCEA

Modelarea profilelor longitudinale din arealul carpatic concretizează în formă, ritm și intensitate aspectele cele mai variate ale complexelor naturale în care evoluează. Din acest punct de vedere ele trebuie considerate ca repere geografice în identificarea evoluției fiecărui masiv în parte. Este de ajuns să cităm în acest caz interpretarea rupturilor de pantă din profil longitudinal cu cele ale versantelor sau reconstituirea succesivă a etapelor de adâncire a generațiilor de văi pentru stabilirea evoluției geomorfologice a unei unități. Demn de reținut este și faptul că văile îndeplinesc funcții de repere geografice și în cazul stabilirii ierarhiei unităților și subunităților carpatice.

Aprecierea unor elemente cantitative și calitative proprii profilelor longitudinale ale arterelor hidrografice permite depistarea unor cazuri particulare în funcție de care se evidențiază un anumit specific teritorial. Cazurile particulare semnalate în modelarea profilelor longitudinale din Carpați sînt deosebit de variate din punct de vedere genetic și spațial. Ele apar în genere „independente” față de profilul de ansamblu și se detașează ca nuclee de evoluție în sfera cărora sînt înglobate diferențiat zonele limitrofe. Prin aspectele pe care le comportă, ele reflectă un anumit dinamism impus forței apei de caracterele locale, acestea la rîndul lor manifestîndu-se sub diferite forme în profilul longitudinal. Reținem atenția asupra unor astfel de sectoare și anume: obîrșiile, zonele în cadrul cărora în bazin ponderea cea mai mare revine torenților și sectoarelor de intens dinamism suprapuse rupturilor de pantă.

By the features the hydrographic arteries of the Romanian Carpathians impose the landscape, they are inscribed as background elements in the morphological evolution. They recorded the climatic rhythmicity, differentiated in time and space the lithologic and structural elements, and materialized in shape the factors of the natural frame. That is a correlation obliging to a faithful registering of the field data and to their territorial integration-hydrographic basin or relief unit (Mihăilescu, 1968).

Modelling of longitudinal cross-sections of the Carpathian area concretizes in shape, rhythm and intensity the most varied aspects of the natural complexes they are developing in. From this viewpoint,

they should be considered as *geographical markers* in the identification of the evolution of each massif separately. It is sufficient to mention in this case the interpretation of slope ruptures in the longitudinal cross-section, and those of the slopes or the successive reconstitution of the deepening stages of valley generations, to establish the geomorphological evolution of a unit. Noteworthy is also the fact, that valleys hold the function of geographical markers also in the case of establishing the hierarchy of the Carpathian units and sub-units.

The longitudinal cross-sections of the Carpathian hydrographic arteries entail some common features, namely :

- the hydraulic power allows, with a maximum intensity, the release of differential erosion, being expressed in value by large slopes and irregularities of the longitudinal cross-section ;

- the repeatability of equilibrated sectors and of disequilibrated sectors is generating an exceedingly active dynamics ;

- the connectability of longitudinal cross-sections with transversal ones, meaning, in value, the deepening stage, and

- the great mobility in time of the values particular to longitudinal cross-sections.

Assessment of some quantitative¹ and qualitative² elements, proper to longitudinal cross-sections of hydrographic arteries, permits to find out some particular cases, in function of which a certain territorial specific character is revealed. The case histories signaled in modelling longitudinal cross-sections of the Carpathians are uncommonly varied from a genetic and spatial viewpoint. Generally they appear "independent" versus the whole cross-section and are detached as evolution nuclei in whose sphere the adjacent areas are differentiatedly included. By the features they are bearing, they reflect a certain dynamism imposed to the water power by local characters, which in turn are showing up under different forms in the longitudinal cross-section. We draw attention to such sectors, namely : starting points, zones within which in the basin the highest gravity is incumbent on torrents, and sectors of an intense dynamism superposed on slope ruptures.

- The starting points are noted within the longitudinal cross-sections as distinct forms : as higher generations corresponding the levelling surfaces and as some incrustation basins.

The first case, frequent in the Apuseni Mountains designs a strict synchronization : hydrographic artery — levelling surface. The starting points concur, in the longitudinal cross-sections, with the points of origin, which, within a basin, may be superposed or staged, confirming either the continuity of a certain generation of forms, or their diversification (in such a connection also the intermittent starting points are being considered). The signaled aspect designs the perimeter, in which a sequence of particular situations occur in the longitudinal cross-section modelling. The slope processes associated to the starting points

¹ Length of the analysed sector ; relation versus net ; frequency of equilibrium and of disequilibrium sectors ; general slope and on sectors ; slope shape ; irregularity coefficient, etc.

² Shape categories with their gravity in the bed plan ; ordination and subordination sectors ; relation between the shape of the longitudinal cross-section and that of the slope, etc. (Morariu, Velcea, 1971).

favour, in some instances, the advance of the latter, and in others their retreat, a fact that is transmitted to the longitudinal cross-section by accelerating or slowing down the modelling rate. This reciprocity, directioned by the longitudinal cross-section is reflected in slopes. The "drowning" case of the starting points in deluvial and eluvial materials on the Fărcașa platform is well-known, and is generating an actual sectioning of the longitudinal cross-section. The starting point is autonomously developing versus the rest of the cross-section, being detached under the shape of suspended basins, and integrated to the longitudinal cross-section only under the conditions of a manifest regressive erosion. A conclusive example in this sense is built by the integration, within the limits of the basins, of the doline and lapiez fields from the Cărbunari tableland or the karst zone of the Bran-Rucăr passage.

The strongly deepened source basins are marked in the longitudinal cross-sections as origin nuclei with a level function of local basis. The evolution of the latter may be classified in the system of valley and form generations; it is the correspondent of hydrographic concentrations and slope levels, as are recorded in the Leaota, Vilcan Massif and in Gîrbova. Some of the source basins are closely related to the longitudinal cross-section of the valley, exerting more or less influence, in function of the concentration of starting points. Other source basins, however, occur also like nivation cirques, what is "individualizing" them as processes and forms versus the rest of the basin. Towards them converge the stone torrents, nival torrents and hydrographic arteries with a reduced permanence. These basins — levels of local base — control the evolution of adjacent slopes, and for the longitudinal cross-sections they are generators of liquid and solid flow pulsations. In case of some small hydrographic arteries — the tributaries of Teleajen from the Ciucas — these source zones can influence the development of the entire longitudinal cross-section, it remaining to a smaller extent dependent on the collector. This is a particular case, but of a decisive significance in the whole morphology to be taken into account in the geomorphological connections. In these situations, the enlargement of the joint interval is called for — this is the case for the Jiu and Vilcan tributaries, where within the same joint steps, altimetric differentiations of about 125 m can be included.

Certainly, the interpretation of the mentioned cases should be correlated with the petrographic nature and structure and with the morphogenetic stage it is evolving in. Thus, there are differentiations between the morphogenetic processes affecting the starting points in the alpine stage, where the snow cover is interfering with this evolution and those in the zone of afforested slopes, where the drain conditions provide the connection between the source basins and the rest of the longitudinal cross-section.

Hence, there results an areal of the starting points with its particularity of shapes and processes, directioning the modelling of longitudinal cross-sections.

— Within the different hydrographic basins the coefficient of torrentiality³ appears exceedingly diversified, a fact being imposed in the par-

³ The relation between the whole surface of the basin and the surfaces of the component torrential basins. This value in fact reflects the general structure of the basin.

ticularity of modelling the longitudinal cross-section. There, where the torrentiality coefficient has a sudden raise, disequilibrium sectors are forming, of a chaotic dynamics, of rapid changes. The torrential conditions are imposing within the collecting net by more manifest slope ruptures or by accumulation of the most different shapes of deposits. Thus we may explain the diversity of shapes in the upper Prahova valley, where the major gravity of instability of the bed sectors is generated by the torrentiality coefficient of Gîrbova. Accumulation of snows in the source basins and the sudden melting of the former provide the formation of maximum flows, they are, however, rapidly evacuated, the valley passages having steep slopes. The liquid and solid flow thus delivered, records in the Prahova a character of torrential manifestations. Considering also the different exposure of the two slopes — the Bucegi and Gîrbova — the rhythmicity of the torrential manifestations records high frequencies and values. We consider, according to the present configuration of the valley, that it is a relic phenomenon, inherited also at present, yet at another scale. These genetic elements explain the contrast between the wide flow bed of the water in which is included also the montane zone between Buşteni and Sinaia.

Under such conditions the cross-sections appear step-like with equilibrium and disequilibrium sectors. Simultaneously, each step forms and activity core upon the upstream sectors. Within the longitudinal cross-sections the small basins appear like steps generated by differential erosion and being intensely alluvionated. The small basins in the Ialomiţa Valley, e.g., in the Bucegi, functioned as zones of an intense mudding, a relic feature, manifesting also today; where, due to the strong meandering and unbraidings, the erosion is diminished within the bed. Alluvials are of a very high gravity, even in the wetted perimeter. The torrentiality conditions are felt, however, also then, when due to the high water level, the small basins are turned into lacustrine troughs. Generally, down-stream, the small basins are isolated through the defiles, which make difficult the flow of the waters. The new cross-section, formed with the water evacuation, appears like a disequilibrium sector. These changes become more evident still in case of superposing high floods from the basin.

Flow pulsations of a torrential nature (torrential manifestations) explain the mobility of processes and forms; the rapidity by which these are succeeding generates the most chaotic aspects of the longitudinal cross-sections. Thus we are explaining the presence of some thalweg successions within the wetted perimeter, the disagreement between the sinuosity coefficient of the valley and that of the wet perimeter or the kettle levels, which are strongly sunken (the Nera Valley in the defile, the Buzău Valley, the Trotuş Valley, etc.).

The torrentiality coefficient is evident in the confluence zones. The dejection cones or rolled materials on the bed bottom within the confluences generate actual disturbances in the water flow. There occur processes of thalweg deviations, accumulation in submersion and emersion state of alluvials, generating superraised sectors of the beds. The longitudinal cross-section becomes unstable, being different from the up-stream and down-stream sector. Such cases are frequent in the Carpathians in

interference zones mountain-intramontane depressions or in those of transition to the Subcarpathians. This fact requires, that in passing from the shoulder system to that of terraces (Vilsan, 1939), the statement of superraised sectors of the beds by accumulation of alluvials be selfevident.

We simultaneously underline the differentiated role of the torrentiality processes with evident effects in the modelling of longitudinal cross-sections as a result of the morphogenetic ranging. We would mention here the instance of stone torrents in the Piatra Craiului Massif or the Vinturarița, contributing to the detachment of some higher sectors as against the whole valley complex (V. Velcea, 1968).

Torrentiality, through its different manifestation forms, produces obvious changes in the modelling of river beds, but especially, differentiations of sectors to their very individualization and quite apart functioning versus the entire longitudinal cross-section.

The sectors of intense dynamism overlying the slope ruptures form, in fact, a characteristic of the longitudinal cross-sections of the hydrographic arteries in the Carpathians. Generally, their altimetric diversification, the frequency of the slope ruptures and their association in the longitudinal cross-section is controlled by the way of activity of the waters in function of the local elements. The differential erosion beside the rhythmicity of the superposing in time of the erosion systems is identified within the irregularities of the longitudinal cross-section⁴.

Through their dynamism and the processes they generate, the slope ruptures may be considered as disequilibrium elements, which develop their influence area in function of the slope they are in. Therefrom results also the limitation of their activity field.

In the Carpathian defiles, the presence of these ruptures as nuclei of an extremely intense dynamics explains the incrustation rhythm and form. Hence, results the correspondence of the slope-shoulder rupture and incrustation coefficient-hypsometric steps. Strengthening of the slope ruptures or their annihilation produces special cases in the acceleration and in the diminution of the fluvatile erosion within the entire valley complex. Thus, the slope processes are associated to the deepening rhythm of the valley — the instance of Buzău, down-stream of the Intorsura Buzăului depression or the Jiu instance in the Livezeni-Bumbești defile.

In this way, there may appear weathering areals on the slopes which also influence in a decisive manner the evolution of the longitudinal cross-section. That is the case of the slope processes, which bar the water courses and impose a clear qualitative differentiation in the longitudinal cross-sections. This phenomenon should be generalized for the large transversal valleys, in whose configuration appear disconformity sectors. Thus results the moving of the activity centre from the longitudinal cross-section to the slope and the directioning of the evolution in function of the produced new nucleus.

In the morphological evolution, these aspects of differentiated dynamism have formed the elements, which individualized the stages and which facilitated the connections at a much larger scale.

⁴ To this are useful the quantitative indexes, i.e. : the altimetric value of the slope ruptures, their frequency, gravity on the hypsometric steps within the longitudinal cross-section, etc.

Slope ruptures may be also associated, a fact that controls a highly developed dynamism and a disequilibrium of the entire longitudinal cross-section. Thus, the grouping of the slope ruptures in the glacial sectors of the Carpathian valleys results in their suspending versus the fluvial sector in which the incrustation levels appear, beside the small basin levels as a natural consequence of this labour.

Within the montane zones, this — concentrated — manifest dynamism generates the presence of some sectors directing the evolution of the entire massif. The Vilsan Valley up-stream of Brădet is transmitting through the agency of its tributaries a more manifest modelling rate of the longitudinal cross-sections.

The sphere of dynamism of the slope ruptures may extend also to the adjacent zones, besides the montane area. Thus, the succession of slope ruptures in the Prahova defile at Posada is being felt also in the Subcarpathians. The accelerated carving rhythm was, in fact imposed also to the new valley generation (at the contact with the Subcarpathians), which explains the detachment possibilities of the Comarnic depression. This situation may be generalized for all contact depressions. Individuation of the dynamism of water courses on the contact areas, of interference, form a genetic criterion of first order in the fixation of limits.

Modelling of longitudinal cross-sections in the Carpathians by the aspects they display, suggests the ground relations of the morphogenetic evolution, simultaneously concretizing the local diversification directions.

REFERENCES

- MIHĂILESCU V. (1968). *Geografie teoretică*, Ed. Academiei, Bucharest.
 MORARIU T., VELCEA V. (1971). *Principii și metode de cercetare în geografia fizică*. Ed. Academiei, Bucharest.
 VĂLSAN G. (1939). *Morfologia văii superioare a Prahovei și a regiunilor vecine*. B.S.R.G., **LVIII**.
 VELCEA V. (1968). *Considérations sur le modèle de versant dans les Carpates roumaines*, Rev. roum. géol., géoph. et géogr., **XII**, 1—2.

Received December 18, 1971

*General Physical Geography Department
 Faculty of Geology and Geography
 University of Bucharest*

CONSIDÉRATIONS SUR L'ÉLABORATION DES CARTES GÉOMORPHOLOGIQUES GÉNÉRALES

(Carte géomorphologique de la plaine de l'Argeș inférieur)

par L. BADEA et GH. NICULESCU

Dezvoltarea geomorfologiei și necesitățile de utilizare tot mai largă a rezultatelor cercetărilor ei în domenii de activitate foarte variate reprezintă un adevărat stimulent pentru soluționarea corespunzătoare a problemei reprezentării fenomenelor geomorfologice la diferite scări și pentru diferite scopuri. Cu toate acestea, problema hărților geomorfologice generale este încă departe de a fi rezolvată. Pe plan internațional sînt foarte numeroase propunerile și variantele de legendă pentru o hartă geomorfologică generală la scară mare, dar foarte puține sînt cele aplicate pentru reprezentarea unor regiuni cu relief variat. Comparativ cu complexitatea formelor, în prezent există mult prea puține verificări ale valabilității unei legende generale prin aplicare pe spații întinse în cuprinsul cărora se găsește o mare diversitate a formelor de relief.

Pentru evitarea dificultăților și ajungerea la o legendă generală, cu variante pentru diferite scări, corespunzătoare particularităților morfologice ale teritoriului României (fiindcă nu poate fi vorba de o legendă generală cu aplicare universală la orice scară), am adoptat calea realizării unor fragmente de hartă (deocamdată la scara 1:200.000) incluzînd porțiuni de teren cît mai variate ca aspect, ca fragmentare, constituție geologică etc. Se creează, astfel, posibilitatea comparărilor, completărilor și modificărilor succesive, indispensabile definitivării legendei hărții geomorfologice generale.

Pentru început s-a ales o porțiune (din partea sudică a Cîmpiei Române) cu relief mai puțin complicat, dar reprezentativ pentru categoria unităților de relief tinere, formate în special prin acumulare fluvio-lacustră și modelate recent mai ales de acțiunea fluvială.

La grande majorité des chercheurs qui étudient le relief sont d'accord pour affirmer qu'une carte géomorphologique générale doit, obligatoirement, présenter tant la diversité et la répartition des formes de relief, leurs particularités extérieures, que leur genèse et leur âge, mais si l'on ne se rapporte qu'à une partie des travaux de cartographie géomorphologique (quel que soit leur intérêt), cet accord représente un fait peu important et en quel-

que sorte formel par rapport au désaccord et aux difficultés qui interviennent lorsqu'il s'agit de l'application pratique du desideratum général, unanimement reconnu. La cartographie géomorphologique doit embrasser non seulement l'infinie variété des particularités propres aux formes de relief, mais aussi leur mode d'agencement sur un territoire donné. De plus, la représentation graphique d'une certaine réalité objective doit également englober (ou refléter) des éléments qui tiennent plutôt du domaine de l'interprétation géomorphologique (et impliquent un certain degré de subjectivité), lesquels, d'une manière ou d'une autre, forment un commencement de différenciation des points de vue, l'exagération ou la surestimation de l'un des traits du relief — la forme, la genèse, l'âge, etc. — que la carte doit contenir.

Parfois, les cartes se bornent à la représentation des formes avec la mise en évidence uniquement (ou avec priorité) des aspects extérieurs morphométriques ou morphographiques. Dans d'autres cas, en exagérant les éléments génétiques et structuraux, le caractère géographique des cartes a été subordonné au caractère géologique. Il y a des cas, assez fréquents, où la présentation des types de relief est fixée comme contenu de la carte géomorphologique, sans tenir compte du fait que la typisation du relief conduit à des généralisations lesquelles, exprimées graphiquement, donnent à la carte géomorphologique générale les caractères d'une carte de régionalisation géomorphologique.

Sur le plan international, les propositions et les variantes de légende pour une carte géomorphologique générale, à grande échelle, sont nombreuses, mais un très petit nombre a été mis en application, au moins pour quelques régions considérées comme étant plus complexes et représentatives.

Par conséquent, en comparaison avec la complexité des formes et la diversité du relief, à l'heure actuelle nous détenons beaucoup trop peu de vérifications concernant la valabilité d'une légende générale susceptible d'être utilisée pour la représentation d'espaces plus vastes allant jusqu'aux étendues continentales. Et ce défaut d'application et de vérification pratique des légendes se maintient, en dépit de la nécessité (parfois aiguë) d'utiliser des cartes géomorphologiques dans des domaines d'activité de plus en plus variés.

Le fait de ne pas utiliser des légendes générales pour l'élaboration de cartes représentant différentes catégories de relief pourrait aussi être interprété comme une conséquence de l'élaboration et de l'accomplissement de ces légendes nullement par une action préalable de cartographie géomorphologique (établissement des variantes) portant sur certains territoires, mais par la transposition en symboles de quelques schémas théoriques, logiques, de cabinet, d'une composition rigoureusement scientifique, idéaux peut-être, mais qui n'ont pas été vérifiés du point de vue technique par une confrontation avec la diversité du relief. Une pareille interprétation est pleinement justifiée puisqu'il y a des auteurs qui ont même affirmé la possibilité de construire et d'exécuter une légende complexe, universelle (pour une grande échelle — 1 : 20 000^e ou 1 : 25 000^e), d'une application générale quelle que soit l'échelle (par des simplifications de circonstance seulement) ou la région étudiée.

De même qu'une théorie (hypothèse) ne prouve sa valabilité et son efficience que lorsqu'elle est confrontée avec la pratique (par application

directe), une légende de carte géomorphologique générale ne s'avère valable qu'après avoir été utilisée, c'est-à-dire seulement lorsque, sur la base de ses données, on a réalisé au moins une portion de la carte géomorphologique d'un territoire, à l'échelle pour laquelle cette légende a été spécialement créée. Ainsi, quelle que soit la rigueur scientifique et la logique qui ont présidé à l'élaboration d'une échelle, celle-ci ne sera qu'une simple classification de cabinet des phénomènes, et on ne sera jamais à même de savoir si elle est capable de mettre d'accord les deux conditions nécessaires pour réaliser une carte géomorphologique générale, à savoir :

— représenter la réalité (le relief) dans sa complexité, mais de manière synthétique et explicite ;

— s'adapter aux possibilités techniques (assez limitées) susceptibles d'inclure et de concrétiser graphiquement la complexité du relief, due à l'action prolongée d'une multitude de phénomènes endo- et exogènes.

La constitution d'une légende (en fonction de l'échelle et du but poursuivi, des particularités et du degré de connaissance du territoire) implique de multiples discussions et échanges de vues dont l'amplification ne pouvait aboutir à une finalisation graphique utile et nécessaire à la phase actuelle de développement de la cartographie géomorphologique roumaine. Ce n'est qu'en cherchant pratiquement la voie qui permet de réaliser une carte par une notation graphique variée du plus grand nombre possible de portions de terrain à des échelles différentes (créant ainsi la possibilité de comparer, de compléter et de modifier au fur et à mesure) qu'on peut aboutir à l'élaboration d'une légende unitaire pour la carte géomorphologique générale du pays entier, mais diversifiée à des échelles petites, moyennes et grandes. Pour cette raison, nous avons commencé par établir les cartes géomorphologiques de certaines surfaces de terrain caractéristiques à une échelle moyenne (1: 200 000^e), considérée comme la plus convenable au stade actuel, tant sous le rapport du degré de connaissance de l'ensemble du territoire et des forces d'exécution, que sous celui des nécessités d'utilisation.

Pour le début, on a choisi une région à relief moins fragmenté et moins compliqué du point de vue de son évolution, mais qui est représentative pour la catégorie des unités de relief récentes dues surtout à l'accumulation fluvio-lacustre et modelées depuis peu par un complexe de processus qui prédominent sur ceux qui sont dus aux écoulements.

Comme principe de travail, on a considéré nécessaire d'adopter une légende explicite destinée à un déchiffrement aussi aisé que possible des phénomènes, comme on a procédé pour l'élaboration des cartes géomorphologiques de la vallée du Danube (*Géographie de la Vallée du Danube roumain*, 1969). De plus on s'est attaché à faire correspondre le mode de représentation des formes de relief, en premier lieu, à leur classification génétique.

D'abord, par un fond coloré, on a représenté les formes principales qui correspondent aux grandes divisions du relief, séparées, dans certains cas aussi, comme effet des particularités morphostructurales. Dans le cas de la carte établie pour la plaine de l'Argeș inférieur, cette catégorie de relief est représentée par la partie est du Burnaz, la partie sud des plaines du Neajlov et du Cîlnău et la partie sud-ouest de la Plaine de Mostiștea, étant toutes des surfaces initiales d'origine fluvio-lacustre recouvertes de lœss ou de dépôts lœssoides.

La deuxième catégorie de formes est constituée par les gradins des vallées créées par des rivières dans les surfaces initiales (comme effet d'un approfondissement continu et rythmique), c'est-à-dire sur les terrasses et les lits alluviaux. Ces formes ont été également rendues en couleur, dans différentes nuances.

Sur le fond coloré de la carte — c'est-à-dire des formes principales de relief — sont superposées les signes des formes mineures (simples et élémentaires) dues à l'action simple d'un agent. Leur séparation et leur classification ont été faites selon l'agent — formes dues à la gravitation, formes de ruissellement, formes fluviales élémentaires, formes d'abrasion lacustre, formes éoliennes, forme de tassement, etc. — et selon la nature du processus (action de l'agent, nature de la forme), processus d'érosion ou d'accumulation.

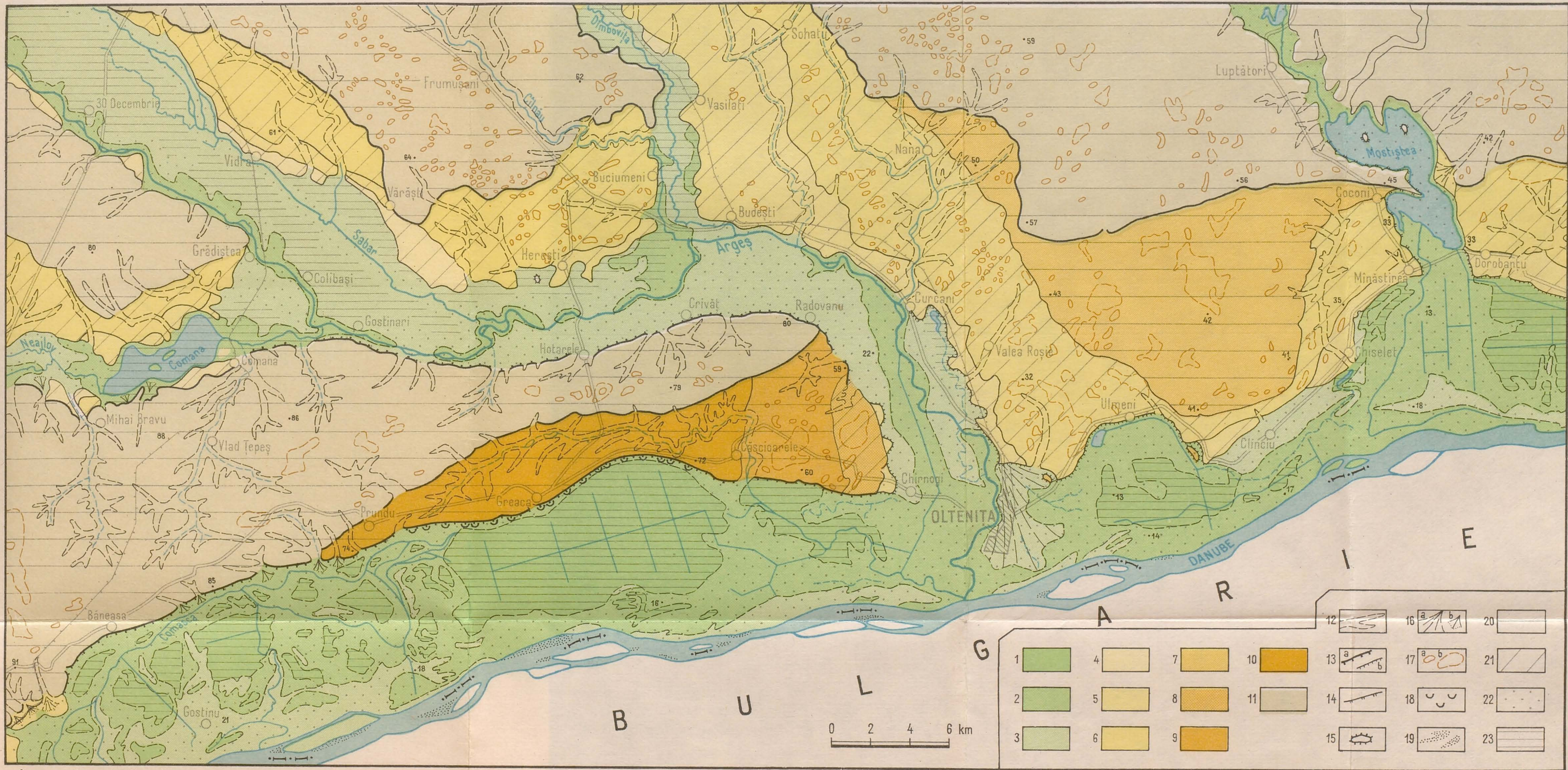
Par des hâchures de formes, densités ou couleurs différentes, on indique les dépôts superficiels ameublés. Ceux-ci sont l'objet d'une attention spéciale, non seulement parce qu'ils représentent les roches-mères pour les sols si précieux des plaines, mais aussi parce qu'ils peuvent donner des indications précieuses concernant l'évolution de la surface qu'ils recouvrent. Le dernier groupe de symboles est destiné à la représentation de formes et de phénomènes très différents les uns des autres (depuis les limites entre unités et surfaces jusqu'aux aires néotectoniques); parmi ceux-ci on place également les éléments topographiques (de planimétrie ou de nivellement), indispensables à une carte géographique.

La difficulté du mode de représentation des versants (comme surfaces inclinées, de raccord) — en fait une difficulté majeure et qui constitue aussi un problème controversé de la cartographie géomorphologique — n'a pas encore été l'objet d'une solution parfaitement satisfaisante.

Le problème du choix des couleurs de fond peut être considéré comme une deuxième difficulté, non pas tant du point de vue technique, de celui de son exécution, mais à cause de sa nature arbitraire et du degré de subjectivité dont il est l'objet. Selon certaines opinions à ce sujet, le fond coloré devrait se rapprocher de celui des cartes géographiques (physiques) habituelles. D'autres préconisent l'utilisation de couleurs empruntées à la légende des cartes géologiques générales, afin de respecter et de suggérer en même temps la nature lithologique et l'âge des formations prédominantes qui entrent dans la composition des unités de relief.

Si l'on tient compte de la grande variété des nuances qu'il faudrait utiliser, on ne peut s'arrêter à aucune de ces opinions. Pour la réalisation d'une carte complète et rigoureusement scientifique, mais esthétique en même temps, est nécessaire une disposition variée et harmonieuse des couleurs, sans négliger l'utilisation de certains couleurs et signes déjà consacrés par les cartes géologiques et topographiques.

En totalisant la complexité et la grande variété des aspects du relief, on est à même d'apprécier à quel point l'élaboration est difficile. Pour cette raison nous estimons que seulement par l'accumulation de nombreuses représentations de régions à relief varié, sur la base des mêmes principes de représentation, on arrivera peu à peu à la création d'une légende unitaire destinée à l'élaboration de la carte géomorphologique générale, à des échelles grandes et moyennes, du territoire de la Roumanie.



Cartographie Viorica Ticulescu

Fig. 1. — Carte géomorphologique de la plaine de l'Argeș inférieur.

1, Basse plaine alluviale et dépressions lacustres anciennes, colmatées; 2, plaine alluviale à altitude moyenne; 3, haute plaine alluviale (bourrelets de rive); 4, terrasse de 4–6 m; 5, terrasse de 8–12 m; 6, terrasse de 18–23 m; 7, terrasse de 30 m; 8, terrasse de 40 m; 9, terrasse de 48–50 m; 10, terrasse de 55–60 m; 11, plaine d'accumulation fluvio-lacustre; 12, vallées; 13, abrupts d'érosion actifs à plus de 15 m d'altitude (a) et à moins de 15 m d'altitude (b); 14, falaises lacustres;

15, buttes-témoins d'érosion; 16, cônes de déjection grands (a) et petits (b); 17, dépressions de tassement petites (« crov ») et grandes (« padina »); 18, relief de glissement; 19, plages et autres formes d'accumulation submergées; 20, loess et dépôts loessoides à plus de 10 mètres d'épaisseur; 21, loess et dépôts loessoides à moins de 10 mètres d'épaisseur par-dessus des dépôts grossiers de terrasse; 22, sables et sables argileux; 23, argiles et argiles sableuses.

LA CARTE DU KARST DES MONTS DE LOCVA (BANAT) SUIVANT LA LÉGENDE INTERNATIONALE

par V. SENCO

La întocmirea hărții carstului din munții Locvei s-a folosit legenda internațională adoptată la al IV-lea Congres Internațional de Speologie (Ljubljana, 1965). Față de aceasta noi am făcut anumite modificări și completări în dorința de a îmbunătăți estetica hărții și de a propune introducerea în legenda carstului și a altor forme carstice cartate pe teren.

La légende de la carte du karst a été adoptée au IV^{ème} Congrès International de Spéléologie de Ljubljana (1965). Elle a été préparée par la Commission des phénomènes karstiques du Comité National Français de Géographie, dont le président est le Pr P. Fénelon.

La légende se propose premièrement une localisation exacte des phénomènes karstiques ; ensuite, chaque groupe de formes est rendu par une couleur distincte. Ainsi, pour les formes positives et négatives de surface (l'exokarst) on a adopté la couleur rouge, pour les formes souterraines (l'endokarst) on a adopté la couleur violette, sauf les niches karstiques et les grottes peu profondes (rendues en rouge). Le réseau hydrographique de surface est rendu en bleu et celui souterrain en vert.

Les signes ont été choisis de manière à pouvoir être utilisés aussi pour les cartes monochromes.

Pour la carte du karst des monts de Locva nous avons adopté cette légende, en apportant quelques modifications afin d'améliorer l'esthétique de la carte et en complétant la légende par des signes nouveaux correspondant à des formes karstiques qui ont été dépistées sur le terrain. Dans la carte que nous présentons on a utilisé seulement quelques-uns des signes proposés.

La légende complète sera discutée par un groupe plus large de chercheurs, avant qu'elle soit utilisée à l'élaboration de la feuille consacrée au karst dans l'Atlas Géographique National de la Roumanie, qui est en train d'être élaboré, dans le cadre de l'Institut de géographie de l'Académie de la République Socialiste de Roumanie.

En ce qui concerne les champs de lapiès et les vallées sèches on a utilisé les signes proposés tant par J. Nicod (1965) que par A. Cavaille (1965).

Les ouvalas ont été rendus par le signe proposé par la légende, mais avec des traits plus gros, afin de les différencier des autres formes négatives. Dans le même esprit on a utilisé une seule ligne pour les poljès, mais plus marquée que pour les ouvalas. Les gorges ont été représentées en noir, tant pour l'esthétique de la carte, que pour le fait que leur origine n'est pas entièrement karstique.

Nous avons introduit dans la légende des signes cartographiques supplémentaires pour les *vallées karstiques semi-aveugles*, les *vallées aveugles*, les *vallées abandonnées* et pour les *vallées de doline*. Pour toutes les formes souterraines on a utilisé la couleur violette; enfin, les grottes et les avens ont été subdivisées en trois catégories (*actives*, *subfossiles* et *fossiles*).

Certaines modifications sont proposées aussi pour les éléments hydrographiques, puisque on a séparé les *sources* (l'émergence de l'eau d'une nappe aquifère phréatique) des *izbuc* (l'émergence de l'eau qui circule sur les canaux karstiques). Cette séparation a été proposée, d'ailleurs, par M. Bleahu et T. Rusu dans leur légende de 1964. De nouveaux signes proposés rendent la circulation de l'eau souterraine démontrée (par la fluorescéine, les spores, etc.) et la *circulation d'eau supposée*.

Pour les accidents tectoniques on a utilisé la couleur grise puisque ces signes ne constituent pas un élément essentiel pour la carte du karst; les signes adoptés sont ceux des cartes géologiques.

En ce qui concerne la représentation des autres formes non karstiques de surface (nappes d'éboulis, cônes de déjection, plaines inondables, terrasses, etc.), on les a rendues en gris, non pour leur importance plus réduite, mais par le fait que ces signes et leurs couleurs doivent être établis par les géomorphologues qui s'occupent de l'élaboration des légendes des cartes géomorphologiques générales à grande échelle, dont la légende internationale du karst n'est qu'une partie.

BIBLIOGRAPHIE

- BLEAHU M., RUSU T. (1964), *Propuneri pentru semnele conventionale ce urmează să fie utilizate în cartografierea regiunilor carstice. Formele exocursive*. Com. geol., Stud. tehn. și econ., Seria F, 5.
- CAYILLÉ A. (1968), *Carte des phénomènes karstiques du camp de Caylus (Tarn-et-Garonne)*. Mémoires et documents. *Phénomènes karstiques*. Nouv. série, 4 (1967).
- FÉNELON P. (1968), *Introduction à une légende pour cartes à grande échelle des phénomènes karstiques*. Mémoires et documents. *Phénomènes karstiques*. Nouv. série, 4 (1967).
- NICOD J. (1968), *Carte des phénomènes karstiques des plans du Verdon*. Mémoires et documents. *Phénomènes karstiques*. Nouv. série, 4 (1967).
- RĂILEANU GR., NĂSTĂSEANU S., DINĂ AL. (1961), *Geologia regiunii cuprinsă între V. Nerei și Dunăre*. Acad. R.P.R., Studii și cercet. geol., VI.
- * * * (1965), *Légende de la carte des phénomènes karstiques*. Mémoires et documents. *Phénomènes karstiques*. Nouv. série, 4 (1967).
- * * * (1966), *Signes conventionnels à l'usage des spéléologues*. Stalactile, 3.

Reçu le 10 janvier 1972

Section de géographie physique
Institut de géographie de l'Académie
de la République Socialiste de Roumanie
Bucarest

FOSSIL EOLIAN FORMS IN LOESS DEPOSITS ON THE DANUBE TERRACE IN THE WEST OF THE OLTENIAN PLAIN

by A. BAN and ZENOVIA DOBROTESCU

Se prezintă două profile în sedimentele care alcătuiesc terasa de 15 — 22 m a Dunării. Autorii separă în profil două complexe distincte : un complex aluvial format din pietrișuri și nisipuri siltoase pe seama cărora s-a format și stratul de sol fosil și cel eolian-loessoid alcătuit din nisipuri foarte fine până la medii. Între complexul aluvial și cel loessoid este semnalată prezența unei dune fosile, cu o stratificație foarte clară. Autorii încearcă să schițeze unele momente din evoluția terasei cercetate.

Loessial sediments, also involving typical loess deposits, are widespread on the territory of Romania. They may be encountered on wide areas in the Romanian Plain, Dobrogea, Moldova, the plain in the west of the country as well as in the Transylvanian basin.

Numerous studies and investigations carried out by geographers, geologists and pedologists have pointed out the fact that these sediments involve deposits quite varied as concerns genesis and composition, often completely devoid of the characteristic features of the loess. This to a certain extent accounts for the numerous and controversial theories and hypotheses on the origin of loess.

In the last decade, the research team of the laboratory of the Bucharest Institute of Geography has carried out complex investigations on the Danube terraces in the Romanian Plain. These studies, accompanied by numerous analyses (granulometric, spore pollen, etc.), have aimed at establishing the role played in relief formation by the various geomorphological processes, by the paleogeographic framework and by the characteristics of the environment where sediments making up this relief accumulated.

The studies carried out between 1968 and 1970 dealt especially with the 15—22 m. sections in the Danube terrace. This terrace is well developed in the west of the Romanian Plain and has been moulded by loessial and loess deposits, masking its true surface. The accumulations of eolian sand, unfixed or in various fixation stages with variable shape and thickness, also modify to a great extent the surface of the terrace.

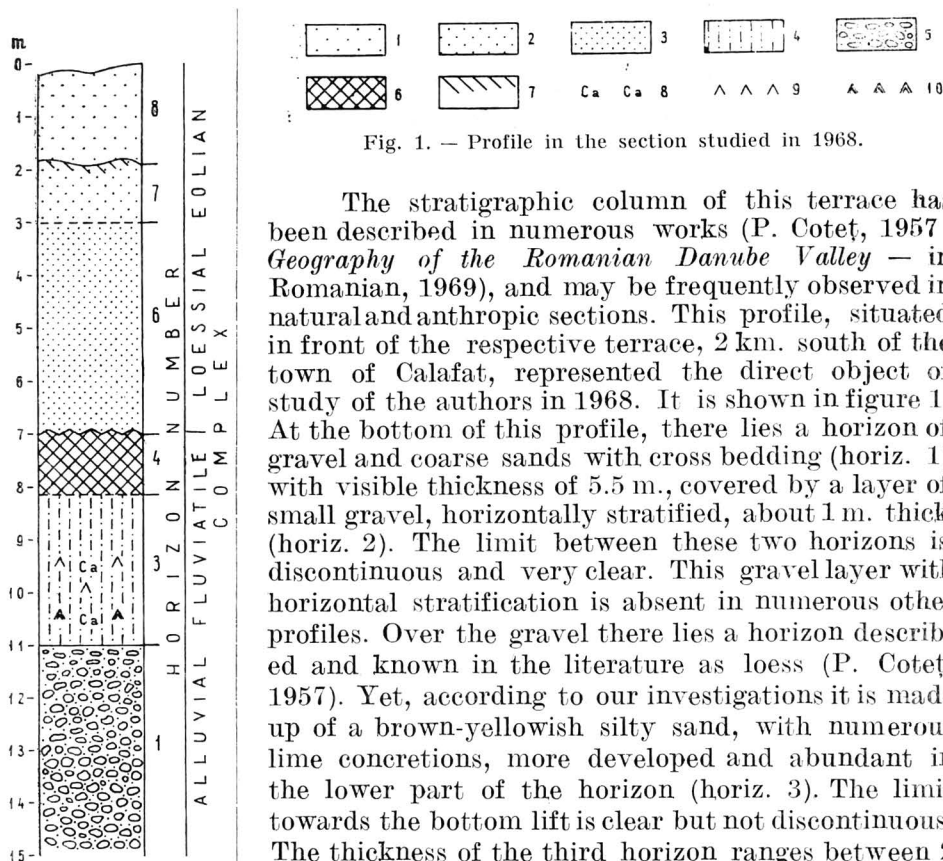


Fig. 1. — Profile in the section studied in 1968.

The stratigraphic column of this terrace has been described in numerous works (P. Cotet, 1957; *Geography of the Romanian Danube Valley* — in Romanian, 1969), and may be frequently observed in natural and anthropic sections. This profile, situated in front of the respective terrace, 2 km. south of the town of Calafat, represented the direct object of study of the authors in 1968. It is shown in figure 1. At the bottom of this profile, there lies a horizon of gravel and coarse sands with cross bedding (horiz. 1) with visible thickness of 5.5 m., covered by a layer of small gravel, horizontally stratified, about 1 m. thick (horiz. 2). The limit between these two horizons is discontinuous and very clear. This gravel layer with horizontal stratification is absent in numerous other profiles. Over the gravel there lies a horizon described and known in the literature as loess (P. Cotet, 1957). Yet, according to our investigations it is made up of a brown-yellowish silty sand, with numerous lime concretions, more developed and abundant in the lower part of the horizon (horiz. 3). The limit towards the bottom lift is clear but not discontinuous. The thickness of the third horizon ranges between 2 and 3 m. Over it, there lies a fossil soil horizon (1.05 — 1.5 m. thick, brown-reddish), formed on silty sand (horiz. 4). The limit between the two horizons (3 and 4) is sinuous and not always clear. Above the horizon of fossil soil lies a layer of yellowish sands (horiz. 6 and 7), whose granulometric composition, very fine at the bottom of the horizon, becomes fine to the upper layer. The thickness of this layer ranges between 3.5 and 7 m.; in its upper part the present soil horizon is formed.

In 1970, at the same point where the above profile was described (Fig. 1), after the extraction of the bottom gravel, there occurred massive land falls, which opened up another profile, not known so far in the studied terrace (Figs 2 and 3).

The new profile generally presented the same stratigraphic column as the profile studied in 1968, and pointed to new elements which permit several specifications on the evolution of this terrace. Between the fossil soil and the very fine sand layer of this new profile, there lies a fossil dune, well developed and with a clear stratification (Fig. 2). The excellent conditions provided by this section permitted to establish both the relation between the fossil dune and the fossil soil on which it lies, and that between them and the very fine sand deposits overlying it. The very clear stratification of the fossil dune is determined by the succession of some sand

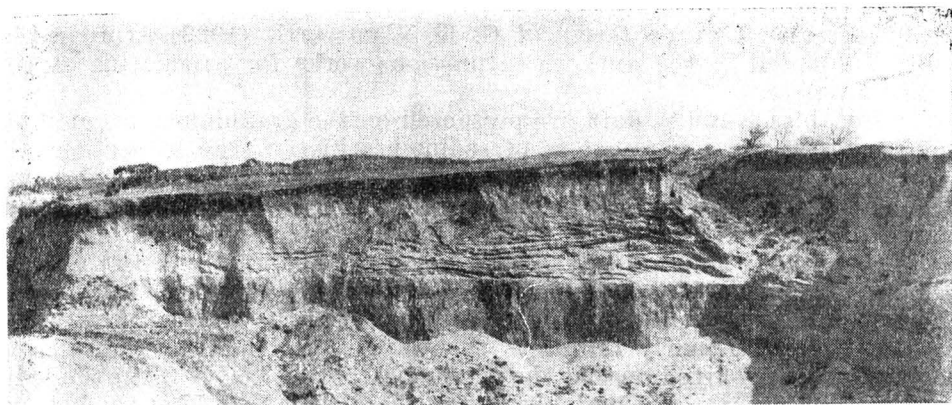


Fig. 2. — General view of the section studied in 1970 (photo A. Ban).

layers with varied granulometric composition. The granulometric composition of sands forming the fossil dune is very close to that of present-day dunes in the south-west of Oltenia.

It should be observed that stratification in the fossil dunes is little studied, as it is very seldom met in sections. Only a few cases are described in the world speciality literature (D.V. Nalivkin, 1956).

The second profile presents some new elements also in its upper part. Above the layer of fine sand there lies a horizon of eolian sands, clearly differentiated, yellowish-greyish, with thicknesses ranging between 0.5 and 1.5 m. The present soil (0.20 — 1.40 m. thick) is developed on the surface of this horizon of eolian sand. Yet, in its turn, this soil is covered by a horizon of unfixed sands, identical to those of present-day dunes.

The granulometric analysis of samples and the statistical processing of findings were carried out according to the method and principles used by the authors in studying other sediments of the Danube valley (A. Ban, Z. Dobrotescu, M. Alexandru, 1970). Account being taken of the very high variability of alluvial and eolian deposits in this region, the authors considered it useful to adopt a simple classification of sediments, based on the textural classification of components, worked out by J. Niggli (1938) and modified by F. J. Pettijohn (1957). This classification

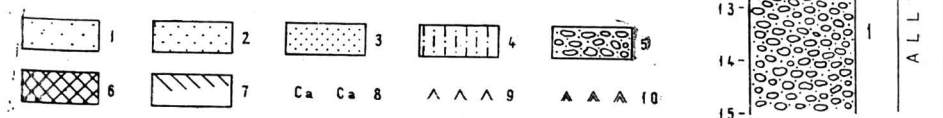


Fig. 3. — Profile in the section studied in 1970.

uses the scale of grade terms of C. K. Wentworth (1922) expressed in units Φ adopted by the authors in previous works for calculating statistical parameters.

In tables 1 and 2, data are presented on the granulometric composition and statistical parameters of sediments in the studied sections. It may be observed that the finer sediments at the profile bottom become ever coarser to the surface. The average size increases from 5.14 units Φ in horizon 3, to 2.16 units Φ in horizon 8. This tendency is also mirrored by the gradual reduction of the clay fraction (<0.002 mm.), in the same direction, between 17.6 and 10.3% horizons at the bottom of the profile (horiz. 3 and 4) and under 3% in the upper part of the profile (between 2.7 and 0.2%). Particularly telling is the way of sorting materials in the section: from unsorted ones at the profile bottom (σ 3.59 — 3.10) the sediments become better and better sorted to the surface (σ 1.77 at the bottom of the complex of very fine sands and σ 0.56 at the profile surface).

Without paying particular attention to some details, we must emphasize, however, the close relation existing between the mineral material carried by the river and the alluvial and eolian deposits on the Danube terraces. The granulometric composition, very similar in alluvial and eolian sands, has rendered much more difficult the separation of these deposits. A similar situation is due to the relatively close granulometric composition of flood plain deposits (especially of high flood plain) and of loessial materials of eolian origin. This is also specific for other large streams, not only the Danube.

The interpretation of data on the granulometric composition must take into account the fact that the profile lies in the close vicinity of the Danube flood plain, in the passage zone of materials blown by the wind in the major bed of the Danube to east terraces. This position has influenced the granulometric composition of profile sediments. In general, in proportion as one goes farther from the Danube, deposits become finer and better sorted. For instance, horizons 6 and 7 become much finer and better sorted only 600 m. eastward (Fig. 4). The change in the granulometric composition and sorting degree is also characteristic of recent sands.



From the analysis of available materials and data, there obviously results that studied profiles have two distinct components: one of alluvial origin and another one of eolian origin.

1. The alluvial component is formed of horizons 1, 2, 3 and 4 from the profiles of figures 1 and 3. Small gravels and coarse sands represent the bed facies, indicating at least two distinct types of hydrodynamic accumulation conditions. Horizons 3 and 4 represent the flood plain facies. The fossil soil horizon (4) and concretions of horizon 3 are related to the evolution of this terrace in its stage of high flood plain. The upper surface of the fossil soil delineates the alluvial complex i.e. terrace deposits, and outlines the surface proper of the stream terrace. The fossil soil horizon is well developed. Its presence, under the cover both of very fine sands and of fossil dunes, points to the existence of a time interval between the formation of the high flood plain surface and the stage of loess accumulation on this surface, sufficient for the formation of a well developed fossil soil horizon and for the accumulation of concretions in horizon 3.

Table 1

Granulometric composition of the main horizons (in %)

No.	horizon	Fractions in mm.											
		> 2	2-1	1-0.5	0.5-0.2	0.2-0.1	0.1-0.05	0.05-0.02	0.02-0.01	0.01-0.005	0.005-0.002	0.002-0.001	< 0.001
1.	8	—	—	0.65	65.82	27.11	5.25	0.20	0.16	0.38	0.16	0.01	0.26
2.	7	—	—	0.81	32.35	40.76	22.46	2.11	0.97	0.20	0.12	0.00	0.22
3.	6	—	0.33	0.53	10.78	26.67	42.05	6.50	1.88	1.58	0.98	0.95	2.72
4.	5	—	—	0.69	62.81	27.01	7.47	0.29	0.27	0.11	0.36	0.22	0.71
5.	4	1.89	1.52	2.23	15.09	21.92	29.76	3.52	1.63	2.17	5.53	4.44	10.30
6.	3	2.08	2.54	2.77	17.67	21.20	23.60	4.95	1.96	2.53	2.19	0.92	17.59

Table 2

Value of statistical parameters expressed in units Φ

No.	Horizon	Md	Mz	σ_1	Sk ₁	K _G	K' _G
1.	8	2.04	2.16	0.56	0.20	0.85	0.46
2.	7	2.68	2.72	0.81	0.08	0.90	0.47
3.	6	3.46	3.33	1.77	-0.13	2.56	0.72
4.	5	2.69	2.73	0.84	0.06	0.68	0.40
5.	4	3.55	4.73	3.10	0.48	0.51	0.34
6.	3	3.46	5.14	3.59	0.49	1.15	0.53

2. The eolian component comprises sands placed above the fossil soil horizon. The position of the dune and of sands on the surface of fossil

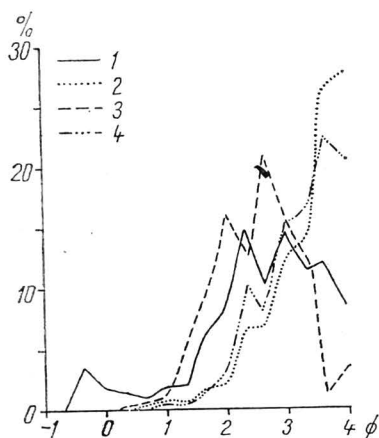


Fig. 4. — Granulometric composition of sand fractions in the horizons 6 and 7, in profile and 600 m. east of the profile :

1, horizon 6 in the profile; 2, horizon 6, 600 m. east of the profile; 3, horizon 7 in the profile; 4, horizon 7, 600 m. east of the profile.

soil as well as the very clear contact between them, proves that eolian sediments subsequently deposited on the already completed terrace surface. The character of the stratification in the fossil dune, as well as the composition of materials making it up, point to a migrating dune on the flood plain surface. The appearance of moving sands on the terrace surface was probably determined by climatic changes which resulted in thermal and moisture changes, as well as in some modifications in the hydrologic river regime.

These modifications evolved in the sense of a more arid climate and of the appearance of more pronounced variations of the Danube level. These conditions have favoured eolian processes, viz. they opened up a wide field of action to sand supply from the major stream bed in droughty periods (at low levels of river water). The granulometric study of eolian deposits, both of fossil dune sands and of very fine and fine sands, leads to the conclusion that the beginning of eolian accumulations at the level of these terraces has occurred at the moment when the river bed was lying much more westward than at present. Based on criteria worked out by the team of the laboratory from the Institute of Geography, this distance

could be estimated to be at least 6 — 8 km¹. As already shown, the upper limit of fine sands presents the formation of a slightly developed soil horizon, which, however, represents a stagnation in the accumulation of eolian material. The identification of the causes which brought about this change in loess accumulation is difficult, before completing pollinologic analyses on these profiles.

In the case of changes which determined the cessation of the accumulation process of very fine sands and the appearance of the slightly developed soil horizon, climatic changes may be presumed and accepted. The main cause which led, however, to the accumulation of the two sand horizons in the upper part of the new profile, placed above the horizon of very fine sands, was related to the displacing of the river in the direction of its present-day position.

REFERENCES

- BADIA I. (1967), *Particularitățile reliefului din sud-vestul Olteniei și posibilitățile de îmbunătățire a valorificării lui*, Studia Univ. "Babeș-Bolyai", Series Geol.-Geogr., Cluj, XII, 2.
- BAN A., DOBROTESCU ZENOVIA, ALEXANDRU MADELEINE (1970), *Contribuții la studiul sedimentelor de luncă ale Dunării și al nisipurilor mobile de la vest de Olț*, St. Cerc. Geol., Geofiz., Geogr., Seria Geografie, XVII, 1.
- COTET P. (1957), *Cimpia Olteniei — Studiu geomorfologic*, Ed. științifică, Bucharest.
- NALIVKIN D. V. (1956), *Uchenie o fatsiakh*, Izd. Akad. Nauk S.S.S.R., Leningrad.
- NIGGLI J. (1938), *Zusammensetzung und Klassifikation der Lockergesteine Schweiz*, Archiv für angew. Wiss. u. Tech., 4.
- PETTICORN F. J. (1957), *Sedimentary rocks*, Harper and Brothers, New York.
- WENTWORTH C. K. (1922), *A scale of grade terms for clastic sediments*, Journ. of Geol., 30.
- *** (1960), *Monografia geografică a R.P.R. I, Geografia fizică*, Ed. Academiei, Bucharest.
- *** (1969), *Geografia văii Dunării românești*, Ed. Academiei, Bucharest.

Received November 25, 1971

*Department of Physical Geography
Institute of Geography of the
Academy of the Socialist Republic of Romania
Bucharest*

¹ A. Ban, Madeleine Alexandru, Alexandra Bunesco, Zenovia Gafencu, *Studies on sands in Oltenia*. Communicated at the scientific session of the Bucharest Institute of Geography (1966).

THE STUDY OF CORRELATED DEPOSITS BY MEANS OF OSCILLOGRAM, RHYTHMOGRAM AND ROSE-DIAGRAM

(with examples from North Oltenia)

by ILIE D. ION

Studiul sectoarelor acumulative ale suprafețelor de nivelare prin utilizarea oscilogramei, ritmogramei și diagramei-roză — din ce în ce mai uzitat în tot mai multe țări ale lumii — permite formularea unor idei asupra: elongației, paleo-hidrologiei și paleoclimiei; sensului și amplitudinilor mișcărilor neotectonice; migrărilor în timp și spațiu ale liniei de țărm; precizării ritmului sedimentării și, indirect, al celui de denudare etc. Prin această prismă sint interpretate metodice și paleogeografice coloanele stratigrafice sintetice ale zonelor Brediceni, Polovragi-Novaci, Schela, Crasna și Izvarna din nordul Olteniei, făcându-se aprecieri asupra condițiilor de modelare a suprafețelor de nivelare din zonele muntoase limitrofe.

The last decades are characterized by a manifold use, more and more diversified, of correlated deposits in paleomorphological reconstitutions. At present, the study of correlated settlements uses successfully, in many countries of the world, the granulometric and morphoscopic-morphometric analyses, the schlich analysis, the tephrochronologic, stratigraphic, archaeological, sporepollinic analyses, the varved clays method and many physical, chemical and other analyses. These methods, used individually or combined, supply useful indications on the nature of correlated settlements, the zones from which they were taken out and their elongation, the transport and settlement conditions, the relations between genetic deposit series and the multistage moulding of the relief with single or multiple layers, etc.

To study the correlated deposits of the denudation domains in higher adjacent territories, some countries (e.g. the U.S.S.R., U.S.A., Japan, a.s.o.) use the oscillogram, the rhythmogram and the rose-diagram. In our country, the use of these analysis means is at its beginning. Consequently, the present paper deals with some methodical elements concerning these morphogenetic analysis means, as well as their illustration by examples from North Oltenia.

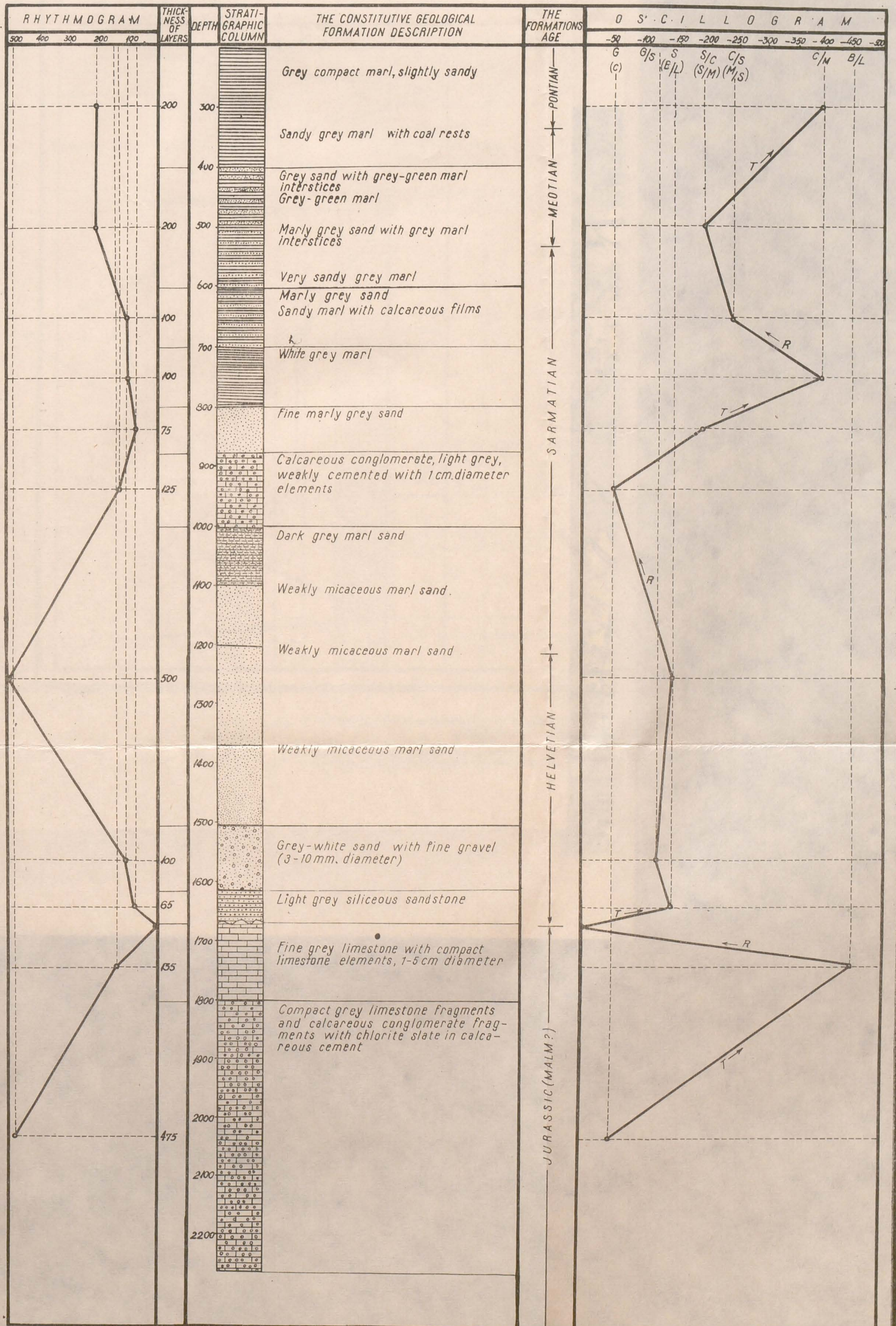


Fig. 1. — The oscillogram and the rhythmogram of Bredicieni stratigraphic column (geology according to T.F.E. Tg. Jiu).

G — gravel; C — conglomerate; G/S — gravel-sand; A — sand; E/L — epicontinental limestone; S/C — sand-clay; S/M — sand-marl; C/S — clay sand; M/S — marl-sand; C/M — clay-marl; B/L — bathyal limestone; T — transgression;

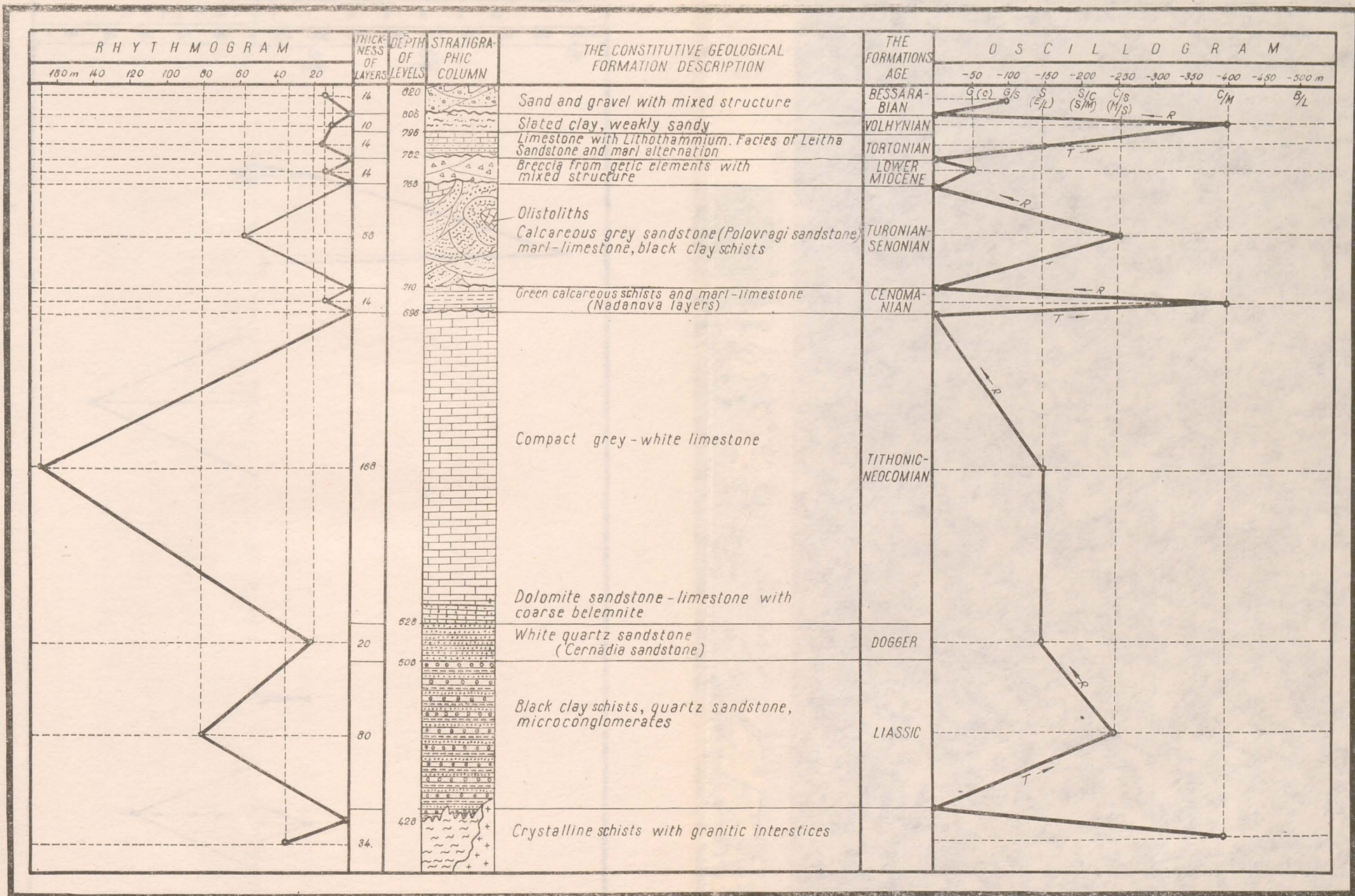


Fig. 2. — The oscillogram and the rhythmogram of stratigraphic column from Polovragi-Novaci zone (geology according to I. Huica).

G — gravel; C — conglomerate; G/S — gravel-sand; S — sand; E/L — epicontinental limestone; S/C — sand-clay; M/S — marl-sand; C/S — clay-sand; C/M — clay-marl; B/L — bathyal limestone; T — transgression; R — regression.

<https://biblioteca-digitala.ro> / <http://rjgeo.ro>

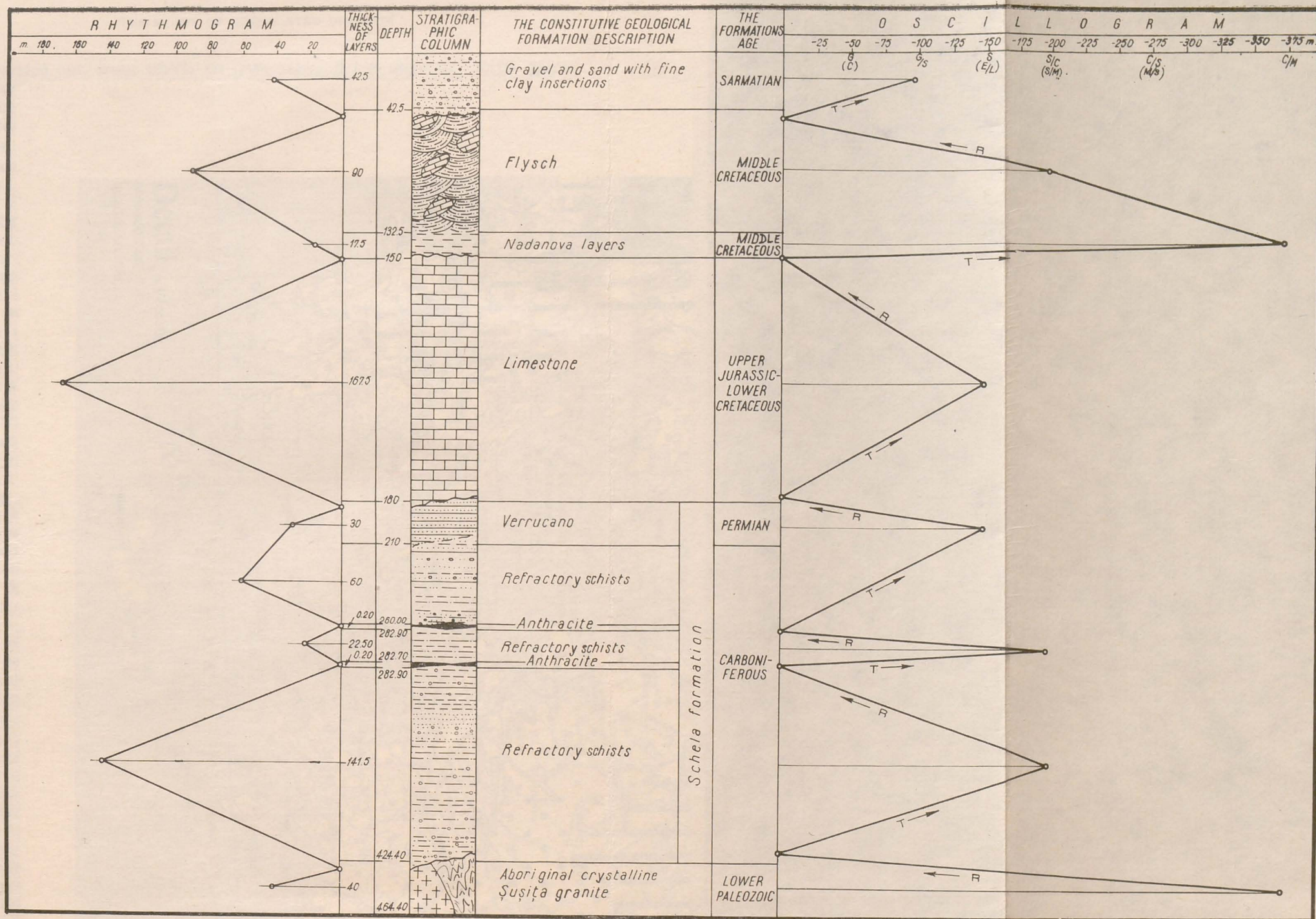


Fig. 3. — The oscillogram and the rhythmogram of Schela-Gorj stratigraphic column (geology according to I. Huica).

G — gravel; C — conglomerate; G/S — gravel-sand; S — sand; E/L — epicontinental limestone; S/C — sand-clay; S/M — sand-marl; C/S — clay-sand; M/S — marl-sand; C/M — clay-marl; T — transgression; R — regression.

Carte bioclimatique de la région méditerranéenne

1 : 5 000 000

1963

Comprend :

Deux feuilles (est et ouest) de 75 × 100 cm chacune, imprimées en 17 couleurs fondamentales.

Quatre petites cartes en couleur au 1 : 10 000 000.

Légende en français et en anglais.

Brochure explicative de 60 pages (21 × 27 cm).

- Le cadre géographique de cette carte dépasse très largement les limites de la région méditerranéenne. Il englobe les contrées situées approximativement entre le 12^e et le 48^e parallèle nord (sans entrer toutefois dans le détail des régions montagneuses de l'Europe occidentale), et s'étend de l'Atlantique à l'Indus. La zone méditerranéenne



néenne proprement dite se trouve ainsi placée au centre de la carte et entourée par les diverses zones de transition vers les autres régions climatiques apparaissant à la périphérie.

- La carte est complétée par quatre petites cartes incluses dans la brochure explicative. Ces cartes, établies selon les mêmes principes de représentation, mais à une échelle plus réduite, couvrent des régions du monde où le climat est de type méditerranéen : Afrique du Sud, Australie, Amérique du Nord et Amérique du Sud.
- Une carte bioclimatique a pour but de représenter, pour une région donnée, une synthèse des facteurs du climat ayant une importance particulière pour les êtres vivants. Parmi ces facteurs, il en est deux dont l'influence décisive est solidement établie : la chaleur et l'eau. Aussi est-ce essentiellement en partant de ces deux facteurs qu'a été brossé sur cette carte le tableau des grands ensembles climatiques qui déterminent les différents types de végétation. Une quarantaine de types climatiques sont représentés par des combinaisons de couleurs et de symboles, choisis de façon à rendre sensibles au premier coup d'œil les grandes divisions écologiques.
- La comparaison de la carte bioclimatique avec la carte

des sols et avec celle de la végétation naturelle est d'un grand intérêt. Une telle comparaison pourra désormais s'effectuer sur une base très sûre grâce, d'une part, à la récente publication de la *Carte de la végétation de la région méditerranéenne*, établie en deux feuilles à la même échelle et sur le même fond de carte et, d'autre part, à la prochaine publication d'une *Carte mondiale des sols*, à la même échelle et en 19 feuilles, dont les numéros V.1, V.2, VI.1, VI.2, VII.1 couvriront approximativement la même région.

- La *Carte bioclimatique de la région méditerranéenne*, et son complément la *Carte de la végétation de la région méditerranéenne*, rendront de grands services aussi bien aux hommes de science de diverses disciplines qu'aux universitaires, administrateurs, techniciens, agronomes, forestiers et, d'une manière générale, à tous ceux dont la profession concerne le développement des ressources naturelles des pays compris dans cette partie du monde.

Prix (hors taxes) : 35 F; 50/- (£ 2.50) [stg.].

Les prix pourront être ajustés aux cours du change en vigueur au moment de la commande.

Adressez vos commandes à l'agent de vente dans votre pays, mentionné ci-contre, ou, à défaut, à l'Unesco, Division de la distribution, place de Fontenoy, 75 Paris-7^e (France) :

Cartes scientifiques
de l'Unesco

Vient de paraître

Carte de la végétation de la région méditerranéenne

1 : 5 000 000

Établie sous la direction d'un groupe de phyto-écologistes, nommés conjointement par l'Unesco et la FAO, comprenant les professeurs Gaussen (Toulouse), Emberger (Montpellier), Kassas (Le Caire) et de Philippis (Florence).

Deux feuilles (est et ouest), de 75 × 100 cm chacune, imprimées en 11 couleurs fondamentales.

Légende en français et en anglais.

Brochure explicative de 90 pages (21 × 27 cm). Bilingue : français-anglais.

- La région couverte par cette carte, débordant largement la zone méditerranéenne proprement dite, s'étend, du nord au sud, des zones tempérées de l'Europe et de l'Asie centrale aux forêts ombrophiles tropicales de l'Afrique au-dessous du 12^e parallèle nord et, de l'ouest à l'est, de l'Afrique occidentale à la vallée de l'Indus. Les noms des pays et les frontières ne sont pas indiqués, mais on y a fait figurer les noms géographiques et ceux des villages pouvant aider à localiser les zones de végétation.

- La carte montre 105 types principaux de végétation, divisés en formations climatiques (52), formations éda-



Détail, à l'échelle,
reproduit en
quadrichromie

phiques (46) et végétation introduite ou transformée (7). Ces types principaux sont à leur tour subdivisés, de sorte que le nombre total des divers types de végétation représentés s'élève à 246.

- Le principe général adopté a consisté à montrer la végétation « potentielle » ou végétation climacique, c'est-à-dire la végétation qui s'établirait si l'homme et les animaux n'intervenaient pas pendant une longue période. On a surtout insisté sur la représentation de la physionomie générale de la végétation. Les zones cultivées ne sont pas indiquées; par contre, la végétation due à l'irrigation ou au reboisement est très nettement marquée sur la carte.
- Les zones qui sont généralement représentées comme des régions désertiques uniformes — par exemple, le Sahara et le Grand Désert d'Arabie — sont cartographiées avec le plus grand soin. De même sont marqués clairement les changements qui interviennent dans les régions montagneuses où les ceintures de végétation qui se modifient sur de très courtes distances sont particulièrement difficiles à représenter à pareille échelle.
- Cette carte comprend ainsi un nombre considérable de données qu'on ne trouve pas sur les cartes ordinaires de la végétation. Elle a en outre l'avantage de permettre la comparaison de différentes régions très éloignées les unes des autres.
- Elle a été dessinée à Toulouse par M. Bagnouls, sous la direction des professeurs Gaussen, Lalande et Legris. De leur côté, les artistes cartographes de l'Institut géographique national (France), par l'emploi heureux des

couleurs, ont su lui donner un aspect très agréable qui met en relief la grande richesse d'information qu'elle contient.

- Avec son complément, la *Carte bioclimatique de la région méditerranéenne*, également en deux feuilles, à la même échelle et sur le même fond de carte, publiée conjointement par l'Unesco et la FAO en 1963, la *Carte de la végétation de la région méditerranéenne* constitue une contribution importante à l'étude écologique de cette zone et des régions adjacentes. Elle s'adresse autant aux hommes de science qui recherchent des synthèses et des généralisations, aux universitaires qui y trouveront un précieux instrument d'enseignement, qu'aux administrateurs, aux techniciens, aux agronomes et aux forestiers en quête de vues d'ensemble et de larges comparaisons entre régions différentes. Enfin, et d'une manière générale, à tous ceux qui s'occupent de la planification de l'utilisation des terres, elle offre une base solide de travail, la végétation étant l'un des intégrateurs les plus efficaces des différents éléments du milieu.
- La *Carte bioclimatique de la région méditerranéenne* et la *Carte de la végétation de la région méditerranéenne* seront prochainement complétées par la publication d'une *Carte mondiale des sols* sur la même échelle et en 19 feuilles, dont les numéros V.1, V.2, VI.1, VI.2, VII.1 couvriront approximativement la même région.

Prix (hors taxes) : 41 F; 70/- (£ 3.50) [stg.].

Les prix pourront être ajustés aux cours du change en vigueur au moment de la commande.

Adressez vos commandes à l'agent de vente dans votre pays, mentionné ci-contre, ou, à défaut, à l'Unesco, Division de la distribution, place de Fontenoy, 75 Paris-7^e (France) :

were carried out, from which we have selected for analysis those from Brediceni (Fig. 1), Polovragi-Novaci (Fig. 2), Vaianu and Orlea-Izvarna. For comparison we drew up the oscillogram and rhythmogram of Schela-Gorj zone, localized in the mountain outlying side.

Studying Brediceni case, we conclude: a) the amplitude of the post jurassic movements in mountain and Subcarpathian zones has about 2,700 m. This results from the present frequent position of jurassic limestones in the mountain zone, at +1,400 m. and from the existence of their correlated settlements in the depression at -1,700 m. (from which we subtract + 400 m., i. e. the mean absolute altitude of Oltenian Subcarpathian depression); b) from the Postjurassic till the Helvetian, the Brediceni zone was formed under subaerial conditions. Then, till the end of the Pontian, it was moulded under subaqueous conditions, with frequent oscillations of the shore line and bathymetry. From the Pontian, it was moulded under subaerial conditions. The light-grey calcareous, sarmatian, epicontinental conglomerate proves an unfinished moulding cycle in the case of Rîul Şes surface. Gornoviţa surface, moulded at least at 600 m. under the effect of abrasion and erosion, corresponds, as was to be expected, to a transgressive range of pliocene marl and sand, over 200 m. thick. The rhythmogram of Brediceni column shows two ample deposition rhythms (in the Jurassic (Malm) and Helvetian-Sarmatian). Towards the top of stratigraphical column, the deposits rhythmicity is smoothed.

In Polovragi-Novaci zone, the oscillogram shows: a) six subaerial forming stages of the depression and mountain region, the age of which results from figure 2; b) a large amplitude of shore line migration and of bathymetry; c) the tithonic-neocomian limestone in the depression is localized at 540-696 m. absolute altitude, about 700 m. lower than in mountain zones. The discordance between the Turonian-Senonian and the Lower Miocene evidences Borăscu surface, while that between the Lower Miocene and Tortonian - Rîul Şes and that between Volchinian and Bessarabian - a Gornoviţa level. The rhythmogram has two parts: the lower side - with few, but ample settlement rhythms, and the higher one - with decreased rhythms stimulated by the Laramide, Styrian and Wallachian stages of alpine tectogenesis.

Stratigraphical columns from Văianu and Orlea-Izvarna show cases comparable with those previously described. In turn, the Schela column (Fig. 3) attests specific elements due to its border mountain position: a) the frequent and sometimes long exundation of the zone; the final postsarmatian exundation of the zone, when the Gornoviţa II level is moulded in sarmatian deposits, being largely expanded in the zone; b) the frequent bathymetry oscillations around -100 and -125 m. in depth; c) the alternation of some long settlement cycles (e.g. Schela formation settlement, the jurassic-cretaceous limestone settlement) with short cycles (permo-carboniferous settlements, those of Middle Cretaceous, etc.). The discordance corresponding to the moulding time of Borăscu and Rîul Şes surfaces ($Cr_2-Mo_3^2$) is obvious, as well as the surfaces under the form of subaerial relief stages. Generally, one does not analyse a single oscillogram and a single rhythmogram, but a stratigraphical column series closely and proportionally grouped on the territory. The conclusions are obtained by correlating these results.

Although valuable, the data obtained by means of oscillograms and rhythmograms are restricted. They must be correlated with those obtained with other methods and means in the study of correlated deposits.

THE ROSE-DIAGRAM

The study of accumulative sectors of levelling mono- and polycyclic surfaces, of alluvial or alluviate terraces, of fluvial, lacustrine, marine, etc. accumulation plains can be performed also by using the rose-diagram: circular — when the detrital rock, especially gravel, is not cemented, and semicircular — when the gravel is cemented in conglomerates or breccia. For drawing up the circular diagrams, one analyses the characteristic zonal denudations: a) the inclination angle and the azimuth of each level are measured; b) then, for each level, the azimuth and inclination angle of about 50 galets. These data are tabulated (Table 1); c) then, a diagram is

Table 1
The flat gravel elements position in the first three levels of Crasna outcrop

Level I		Level II		Level III	
Mean azimuth (°)	No. of measurements	Mean azimuth (°)	No. of measurements	Mean azimuth (°)	No. of measurements
4	18	8	10	8	15
15	14	12	11	17	17
24	15	22	7	23	13
35	5	23	9	35	11
47	7	45	5	44	9
55	2	52	3	55	3
—	—	65	5	64	5
—	—	76	1	76	7
83	1	87	3	87	7
94	3	94	5	98	4
105	2	106	7	105	2
113	4	115	5	—	—
—	—	125	1	—	—
—	—	135	3	—	—
147	5	143	5	145	2
156	9	156	9	156	5
167	13	166	11	164	7
175	12	178	13	176	11
184	5	185	11	185	15
197	5	196	7	197	13
—	—	204	9	205	6
—	—	216	4	217	3
—	—	225	6	227	5
—	—	239	1	236	7
245	3	245	3	247	3
260	3	—	—	—	—
270	4	265	5	265	3
275	5	274	3	272	4
286	7	288	5	283	5
292	5	295	3	295	7
302	3	306	7	300	5
313	8	315	4	315	3
324	5	325	7	324	5
335	9	334	9	335	4
344	17	343	15	343	13
354	13	355	17	358	17

drawn up, which contains 36 sectors of 10° each, corresponding to the possible azimuths taken every 10° . From the centre to the periphery, 9 concentric circles equally spaced are drawn up, corresponding to the bend angles of the gravel, which can vary between 0 and 90° . Taking into account the

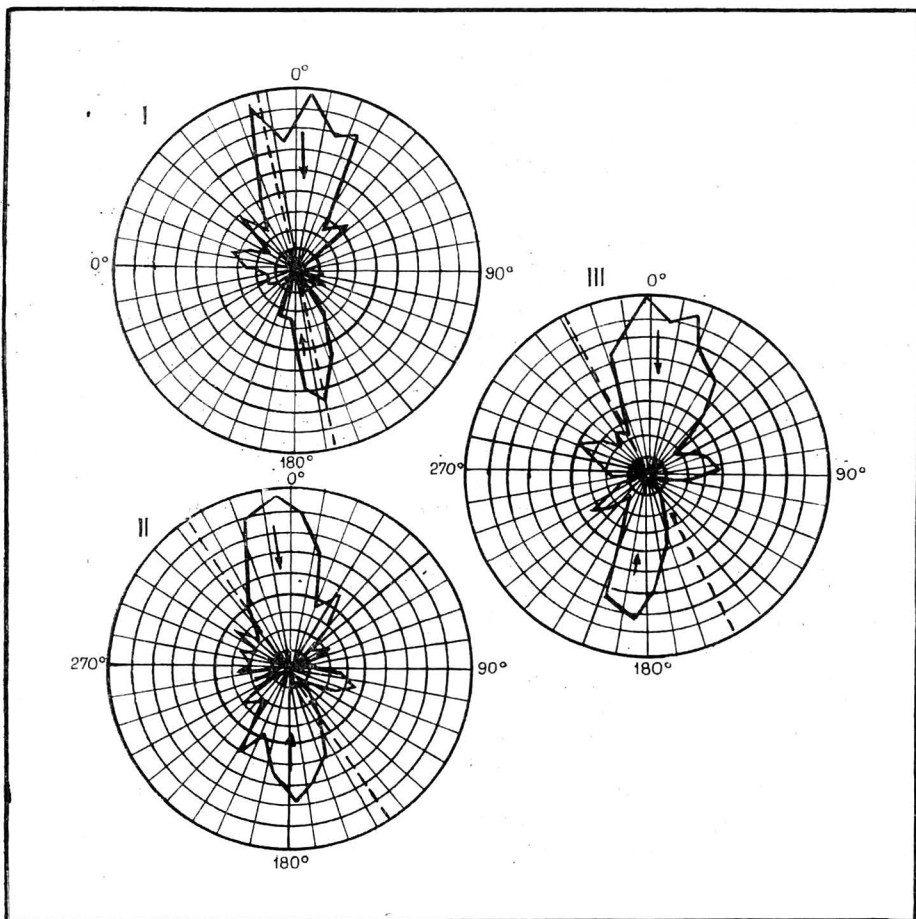


Fig. 4. — The circular diagrams of the flat gravel elements slope in Crasna outcrop levels. I, II and III = no. of levels.

azimuth and the bend angle of each galet, one obtains a point on the diagram. The points with maximum bend angles from each azimuth space are joined; when a space has no point, the points from adjacent spaces are joined with the origin. Thus, differently grouped areas appear on the circular diagram, pointing out the transport medium. The all-points grouping in a diagram quarter shows a fluvatile deposit with a single-way transport. The approximately equal grouping in two symmetric zones (Fig. 4) proves neritico-littoral deposits with an approximately equal prevalence both of river and sea. On the contrary, the symmetric diagrams with unequal areas attest lagoon and delta deposits, where either the river or the sea

is preponderant. To distinguish the fluviatile gravel from the marine one, the asymmetric index according to A. Cailleux (1959, "L'Etude des sables et des galets", Paris) is used.

The analysis of sarmatian sediment formations in Crasna-Drăgoiești zone which contains Gornovița II level (600 m.) led to the drawing up of the table 1 and to the rose-diagrams corresponding to the three specific levels (Fig. 4). The neritic-littoral character of the analysed settlements results from the sector behaviour in the three rose-diagrams. The combination of these data with those obtained morphoscopic-morphometrically and petrographically proves an elongation by about 25 km. of the analysed gravels and their provenance in Muncel, Molidvișul and Plasele peak-zones, all being localized in the south-west side of Paring Mountains.

The semicircular diagrams are drawn up in the case of cemented gravel elements inclined, with respect to the angle of viewing the denudation, to the right or to the left, by $0-90^\circ$. After removing the cement existing over the gravels, the bend angle is measured to the right or to the left for about 40 — 50 elements. From the North, which corresponds to 0° angles, to the left and to the right there are spaces every 10° until 90° , which correspond to the horizontal. The concentric circles point out the increasing number of galets, from the centre (origin) towards the periphery. The galets from each space (e.g. $0^\circ - 10^\circ$, $11^\circ - 20^\circ$, etc.) differ numerically. The obtained points are joined and areas are obtained, as for the circular diagrams. When all points are grouped in half of the circular diagram, the deposition is fluviatile; when the areas are symmetrically disposed referring to the zero axis and approximately equal, the deposition medium is marine, and when they are symmetric but unequal, the settlement domain is deltaic or lagoonal.

The oscillograms, the rhythmograms and the rose-diagrams (circular or semicircular) are scientific, efficient analysis means for the correlated settlements. On account of the limited character of the conclusions drawn on their basis, it is compulsory to corroborate these analyses with other ones. However, it is imperiously necessary to use them in the study of the polygenetical, polycyclic and multistage relief development (e.g. the study of levelling surfaces, of terraces a.s.o.). Hence, the increasing interest for knowing and largely using these paleomorphological reconstitution means.

REFERENCES

- HUICĂ I., ILIE I. (1967), *Evoluția paleogeografică a regiunii Polovragi-Novaci (Oltenia de Nord)*, Anal. Univ. București, Ser. Șt. Nat. Geol.-Geogr., **XVI**, 2.
 ILIE I. (1964), *Suprafața poligenetică de nivelare Crasna-Drăgoești*, Anal. Univ. București, Ser. Șt. Nat. Geol.—Geogr., **XIII**, 2.
 PENCK W. (1961), *Morfologicheskii analiz*, Gosud. Izd. Geogr. literat., Moscow.
 ROȘU AL. (1967), *Subcarpații Oltenei dintre Motru și Gilort. Studiu geomorfologic*, Ed. Academiei, Bucharest.
 RUHIN L. B. (1966), *Bazele litologiei*, Ed. tehnică, Bucharest.

Received December 15. 1971

Department of General Physical Geography
 Faculty of Geology and Geography
 University of Bucharest

THE AREA REQUIRED FOR THE FORMATION OF VARIOUS SIZE BASINS AND MAINTENANCE OF THEIR CHANNELS

by I. ZĂVOIANU

Determinarea suprafeței limită pentru apariția scurgerii organizate, și deci pragul de la care începe modelarea reliefului sub acțiunea rețelei hidrografice, constituie o problemă importantă nu numai pentru studiile de hidrologie și geomorfologie, dar și pentru activitatea practică. Prezenta analiză morfometrică stabilește pe baza unui mare număr de măsurători, legea suprafețelor medii necesare apariției cursurilor de diferite ordine. Diferența dintre termenii progresiei determinată de suprafața medie a bazinelor de ordine succesive și ai celei amintite constituie o nouă progresie, ai cărei termeni dau suprafața medie aferentă lunginii cursurilor de diferite ordine.

Raportul dintre termenii șirului rezultat și ai celui dat de lungimea medie a cursurilor de diferite ordine formează o altă progresie ai cărei termeni dau suprafața bazinală necesară menținerii unei unități de albie de un ordin oarecare. Legitățile amintite sînt importante atît pentru stabilirea modelelor matematice după care se dezvoltă aceste fenomene, cît și pentru activitatea de cercetare practică.

A highly important problem for hydrologic and geomorphological studies is to determine the formation threshold of organized stream channels that is of relief modelling under the action of the hydrographic net. This is particularly important since in the conditions of the intensive utilization of sloping grounds, the areas affected by erosion are rapidly expanding. The complexity of this process is enhanced also by man's interference. In this way in great many areas the natural balance of anti-erosion forces is destroyed and erosion is stimulated. After a short time, rills and gullies are being formed and these phenomena may latter lead to the formation of badlands. The possibility to establish some parameters for the development of mathematical models is rendered rather difficult by the complexity and diversity of these phenomena. To reach some conclusive results it is imperative to use mathematical models based on a large number of measurements performed directly on large-scale maps or photograms. If one were to take into account the fact that a great part of Romania's territory is subjected to erosion and that the hydrographic

network is responsible in the main for it, one would better realize the importance of knowing the fundamentals of these phenomena.

We shall further discuss then, on the one hand, the limit surface area where from organization of the flow in ephemeral channels starts and, on the other hand, the area required for the formation of various-order hydrographic basins.

The factors determining the mean value of the formation area of flow organized in ephemeral channels are rather complex. In addition to the characteristics of precipitation (rate, duration, quantity) one should take into account the topographic features of the area, rate of permeability, granulometric composition of soils, lithology, structure, slope, ratio of vegetation cover, etc. A soil showing a dense vegetal cover depresses, for example, the kinetic energy of rains by drop breaking and in this way, reduces also their aggressiveness. Evidently, at the time when flow precedes the formation of ephemeral channels, there is a continuous clash between erosion forces and resisting forces. Among the latter mention should be made of internal friction, soil cohesion forces, and soil infiltration capacity. Higher permeability involves the absorption of greater water amounts, hence, a larger area is required for the formation of an ephemeral channel. Neither should one overlook the effect of the anthropic activity as it may arrest or stimulate this phenomenon. These are only some of the factors which are to be taken into account when starting analysing such phenomena. If we remember that the clash between the erosion and resisting forces of a topographic area goes on, under almost identical conditions, in the course of very periods of time, it is but normal that the present topographic area be the result of these forces. Consequently, by following the morphometric particularities of the topographic area, one may deduce, provided sufficient measurements are made, a series of laws that could help elucidate the present picture and forecast the future evolution of these phenomena.

The law of the area required for the formation of various size basins. On analysing, for instance, a first-order basin according to Horton-Strahler's classification system, one could notice in the spring area a streamless surface where there prevail surface channels and small rills, non-differentiated morphologically (Fig. 1, A). We know already that by this classification an arbitrary watercourse x is formed by the junction of two lower-order streams $x - 1$. But from the springs of such a stream up to its junction with another stream of the same order, certain lower-order quantitative accumulations take place which result also in the expansion of the surface area of the respective basin (Fig. 1, B). It is known that this accumulation of lower-order watercourses is greatly influenced by the rate of basin lengthening in the sense that the longer a basin the more does it receive as its tributaries a series of lower-order streams without reaching the stage of a higher-order stream. In the case of almost round-shaped basins this stage is reached faster and thus a smaller cumulative surface area is required for the purpose.

A great many measurements were made for various-order basins with a view to analysing the area required for the formation of a basin of each order. For example, the area required for the formation of a third-order basin was assumed to be the one resulting from the junction of two

second-order channels, the area adjoining the confluence point, i. e. the springs of the new higher-order watercourse being planimetrically computed. The limit area necessary to the formation of a fourth-order channel was assumed to be the one formed right after the confluence of two basins of the third order.

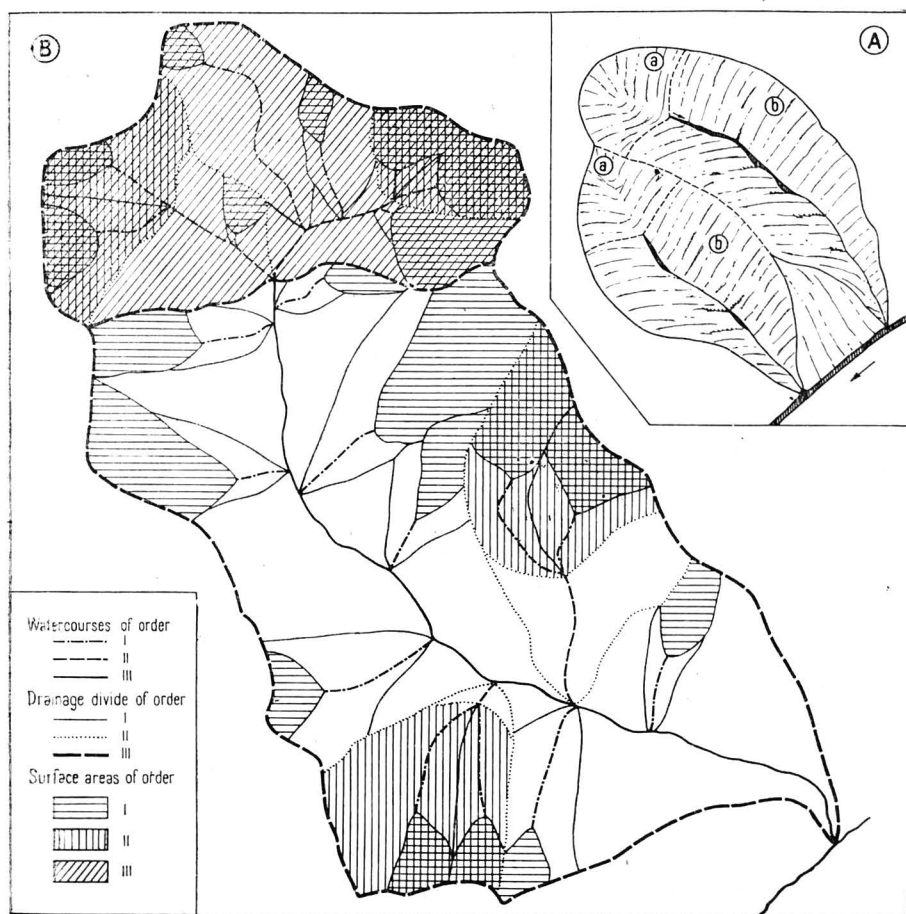


Fig. 1. — Limit surface area required for the formation of various order basins. A. Position of a first-order basin: a, The surface area required for the formation of the channel; b, The surface area afferent to the length channel of the first-order basin; B. Cartographic determination of such areas for various order channels.

Thus the minimum surface area required for the formation of a basin of each order F_x always equals the surface area summated by the first two basins of lower orders F_{x-1} (Fig. 1 B).

$$F_x = 2 F_{x-1}$$

An analysis of the data obtained in this may demonstrated that the average areas required for the formation of successive order basins tend

to form a geometric series as shown also by plotting data for the rivers of the sixth order in the Ialomița basin (Fig. 2). On the strength of this evidence the following law may be deduced : *the limit surface area required*

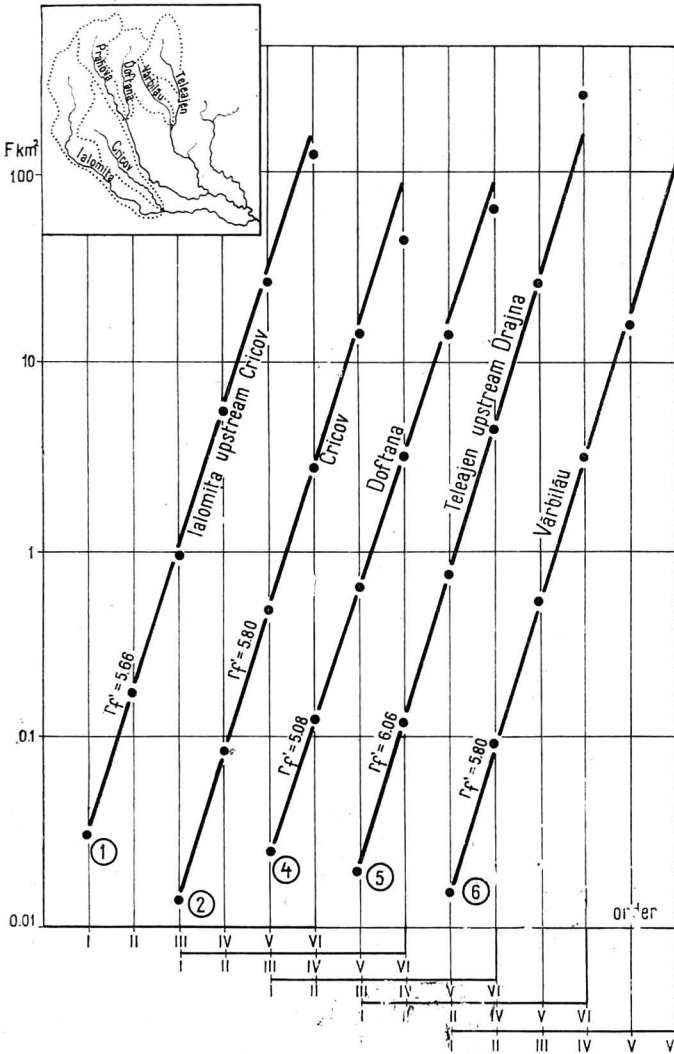


Fig. 2. — Law of limit formation areas of some sixth order rivers in the Ialomița basin.

for the formation of successive order basins tends to form a geometric series whose first term is the limit formation area of first-order basins and increasing according to the ratio of these areas (r_f)

Thus :

$$f_x = f_1 r_f^{x-1} \tag{1}$$

By this law one may establish the mean value of the formation area of each order basin (f_x) provided the limit formation area of first-order watercourses (f_1) and the ratio of the respective series is known (r_f). The ratio obtained can be used for the computation of non-measured values showing how many times the minimum area required for the formation of each order basins is greater or smaller than a lower or higher order. The law was tested for numerous basins. The findings revealed also that the limit formation area of first-order flows is greatly dependent upon the complex of physiographical factors and particularly on lithology, tectonic movements, the ratio of soil vegetation cover, soil, etc. The primary importance of this law, however, lies in the fact that it helps determine the limit area required for the formation of ephemeral channels, which is the moment when organised ephemeral streaming might be assumed to start i.e. the moment of relief modelling by the organised hydrographic network.

The surface area required for the maintenance of a successive order channel unit. This concept has been studied ever since 1956 (Schumm). By establishing a linear function between the surface area and the average length of various-order basins it was proved that the slope of the straight lines represents the surface required for the maintenance of a length unit of channel. This law works for most drainage systems. It proves, at the same time, that the average length of a certain order network is closely related to the average surface area of the corresponding order basin. By this law the author established one of the main drainage values viz. the minimum surface area required for the development of a channel. The parametre denominated *the constant of channel maintenance* is considered the reciprocal of drainage density together with which it provides a means for comparing the factors affecting the erosion surface and the development of the drainage net.

One should remember, however, that all these morphometric analysis were made in to Horton-Strahler's classification system according to which an x order stream or basin is formed only after the confluence of two $x-1$ lower-order streams. It is obvious, however, that this relation represents the average surface area of various orders in respect to the average length of watercourses of the corresponding order. A deep-going study would emphasize that between the values yielded by this procedure and those actually required by the flow on a sloping area to organize the first length unit of channel, demonstrated morphologically, there are some differences.

Therefore these concepts should be analysed in detail. Within each hydrographic basin one should differentiate a limit surface area necessary to the formation of various order channels and an area necessary to the maintenance of each order channel unit, the moment it was formed (Fig. 1 A, B).

The surface required for the formation of an x order channel is equal with the sum of two $x-1$ lower order basins and may be obtained, as already reported, by the geometric series of each basin, if the limit surface area for the formation of a first order stream (f_1) and the ratio of the corresponding progression (r_f) are known (Fig. 2). But for each hydrographic basin there works the law of the average surface areas of successive

order basins (F_n) (Fig. 3), which may be synthetically expressed in the following relation :

$$F_x = F_1 r_F^{x-1} \quad (2)$$

Where F_x represents the average surface area of x order basins, F_1 the average surface area of first-order basins, and r_F the ratio of this series.

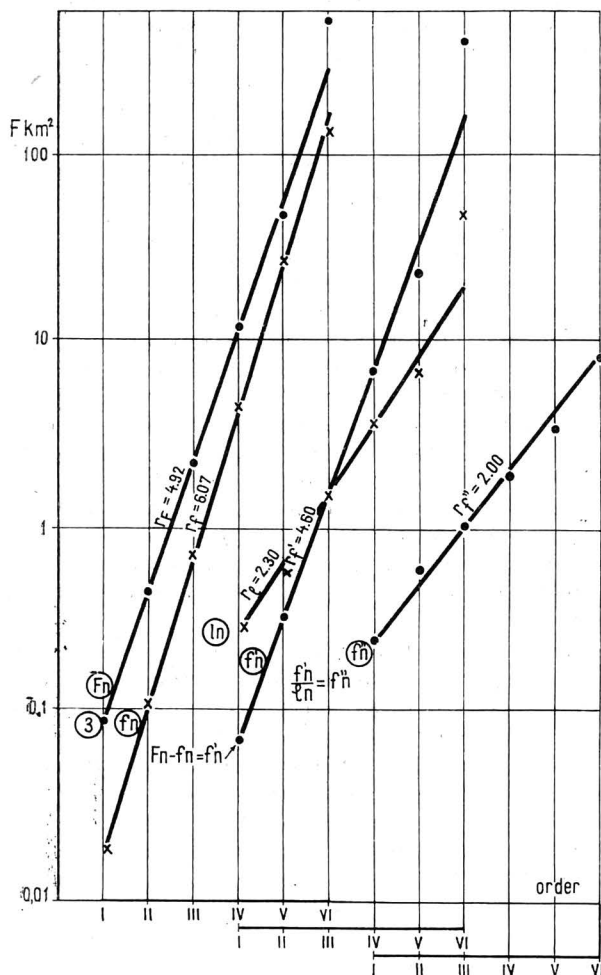


Fig. 3. — Determination of the law of the surface areas required for the maintenance of a successive order channel unit, in the hydrographic basin of the Prahova river, upstream its confluence with the Doftana. F_n . The law of the average surface areas of successive order basins; f_n . The law of the limit surface area required for the formation of successive order basins; f'_n . The law of the average surface area afferent to the average length; l_n . The law of the average lengths; f''_n . The law of the average surface area required for the maintenance of a channel length unit of successive orders.

On these lines, it is quite obvious that, provided there is a geometric series of limit surface areas—as fully proved by the data reported—it is absolutely normal that there is also a geometric series of the average surface area afferent to the length of each basin the moment it started being formed. In terms of a basin of each order, its total area (F_x) should be divided into the surface area required for the formation of the respective order basin (f_x) and the area afferent to the length of the stream (f'_x) so that :

$$F_x = f_x + f'_x$$

This geometric series of the average surface area afferent to the length of each order stream is easily obtainable by using the properties of convergent sequences. Thus from the geometric series of the average surface area of successive order basins (F_n) the geometric series given by the limit formation area of the respective water-course (f_n) is subtracted. From the difference of two convergent sequences, a third convergent sequence would result representing the average areas drained by a course of a given order from its springs to the confluence with another stream of the same order. This geometric series is given by the relation :

$$f'_x = f'_1 r_f'^{x-1} \quad (3)$$

where (f'_x) represents the average surface afferent to the length stream of the same order (f'_1) is the area adjoining the length of first-order streams and (r_f') is the ratio of these areas (fig. 3).

Yet, for the basins of each order in the resulting geometric series there works also a law of the average lengths of successive order streams that also forms a geometric series (l_n) (Fig. 3). According to this law, the average length of successive order streams (l_x) forms a geometric series whose first term is the length of first-order streams (l_1), the ratio (r_l) being the relation of lengths.

$$l_x = l_1 r_l^{x-1} \quad (4)$$

Therefore, the average area required to maintain a channel unit of each order may be deduced by finding the quotient of the two geometric series (f'_n) and (l_n) (Fig. 3). In this case as well, a new geometric series is developed whose terms give for each order the value of the average surface area required for the maintenance of a channel length unit. It is obvious that here the value of terms increases with their order, which means that the higher the order, the larger the area required for the maintenance of the channel of the corresponding order. By extending this assumption to a large number of basins the following law could be established: *the average surface area required for the maintenance of a successive order channel unit (f'_x) tends to form a geometric series beginning with the average area required for the maintenance of a first order channel unit (f'_1) and increasing according to the ratio of the average surface of maintenance of successive order channels (r_f') (fig. 3).* The graphic representation of values along semi-logarithmic co-ordinates proves that the law does work also in the relation :

$$f'_x = f'_1 r_f'^{x-1} \quad (5)$$

Similar results may be obtained also starting from relations (3) and (4) considering that the average surface area required to maintain a channel unit (f'_x) represents the relation between the area adjoining the length of the respective order stream (f_x) and its length (l_x). Hence :

$$f'_x = \frac{f_x}{l_x}$$

If the values of (f'_x) and (l_x) are replaced in this expression we obtain :

$$f'_x = \frac{f'_1 r_{f'}^{x-1}}{l_1 r_{f'}^{x-1}} \quad (6)$$

Known that $f_1/l_1 = f'_1$ and considering $r'_f/r_l = r'_{f'}$ we obtain the relation five.

Hence the ratio of this geometric series (5) may be obtained also directly from the ratios of the two geometric series considered (3) and (4).

In nature there are very many instances when, by the reduction or disappearance of an area adjoining a channel of arbitrary order, that channel loses its functionality or is much depressed. Such instances are often encountered in case of catchements so that either the bottom of a valley or the valley itself are inadequate for the function they are performing. The redistributions of hydrographic networks offer plenty of such examples and we shall not dwell upon this point here. It is certain, however, that the greater the discrepancy between shape and current function, the larger the area taken over by another basin.

In conclusion, we may state that these laws, checked in a large number of basins of great physiographical diversity prove their validity for other regions as well. The findings obtained in this way attest once more that hydrographic basins and the network of adjoining streams do not evolve at random but are governed by well-established laws.

REFERENCES

- DURY G. (1960), *Misfit streams: problems in interpretation discharge and distribution*. Geogr. Rev., **50**, 2, 219–242.
- HORTON R. E. (1945), *Erosional development of streams and their drainage basins: approach to quantitative morphology*, Bull. Geol. Soc. Amer. New York, **56**, 275–370.
- LEOPOLD LUNA B., WOLMAN M. GORDON, MILLER JOHN P. (1964). *Fluvial Processes in Geomorphology*, San Francisco-London.
- SCHUMM A. STANLEY (1956), *Evolution of Drainage System and Slopes in Badlands at Perth Amboy, New Jersey*, Bull. Geol. Soc. Amer., **67**, 597–646.
- STRAHLER A. N. (1964), *Quantitative geomorphology of drainage basins and channel network*, In: *Handbook of applied hydrology compendium of water resources technology*, New York, Sect. 4, **II**, pp. 39–76.
- (1966), *Physical Geography*, New York, London and Sydney.
- ZĂVOIANU I. (1970), *Clasificarea cursurilor torrențiale din punct de vedere morfohidrografic*. St. cerc. geol. geof., geogr., Ser. geogr., **XVIII**, 1.

Received December 15, 1971

*Physical Geographical Department
Institute of Geography of the Academy
of the Socialist Republic of Romania
Bucharest*

ROMANIA'S WATERS AND THEIR POTENTIAL

by PETRE GĂȘTESCU and ARIADNA BREIER

În prima parte se face prezentarea apelor României pe categorii (riuri, lacuri, ape subterane și izvoare), subliniindu-se strinsa lor legătură cu zonele geografice ale țării, iar în a doua parte accentul principal se pune pe problema folosirii și gospodăririi potențialului oferit de aceste ape, în scopuri economice. Resursa principală de apă a țării o constituie riurile care furnizează un debit mediu anual de 6 500 m³/s (dintre care 5 400 m³/s aparțin Dunării). Dintre lacuri, cele artificiale (lacuri de acumulare și iazuri) prezintă importanță prin posibilitatea construirii lor în zonele deficitare sau cu consum de apă sporit. Apele subterane constituie sursa principală de alimentare cu apă potabilă a centrelor populate (rezervele se estimează la un volum de 8,5 milioane m³/an).

Rezervele de apă din țara noastră (fără Dunăre, care are un regim de folosință internațional) nu sînt prea mari (1 862 m³/an/locuitor) și, în timp ce ele rămîn în general constante, cerințele de apă devin din ce în ce mai mari. Astfel, volumul total de apă utilizat înainte de cel de-al doilea război mondial era de 0,8 miliarde m³/an și a crescut ulterior la 2,61 miliarde m³/an în 1960, la 6 miliarde m³/an în 1965 și la 10,10 miliarde m³/an în 1970. De asemenea a devenit posibilă folosirea în tot mai mare măsură a potențialului hidroenergetic al riurilor.

Pentru viitor se preconizează creșterea necesarului de apă la 19,56 miliarde m³/an în 1975 și la 40 miliarde m³/an în 1985, precum și a producției de energie. Asigurarea acestui necesar de apă se va face prin crearea unor acumulări complexe cu un volum de 9 500 milioane m³ și a unor acumulări cu folosință predominant hidroenergetică, avînd un volum de 5 300 milioane m³.

Romania's waters show a rather high variation in respect to origin (rivers, lakes and swamps, spring and underground waters, the Black Sea littoral area) and territorial distribution or annual and multiannual quantitative distribution.

The rivers are closely connected with the mountain (Carpathian), sub-Carpathian and piedmont zone. Most rivers originate from here and, it is in these places that the particularities of their flow are shaped out. The presence of the Carpathian arch in the central part of Romania lends the hydrographic net a radiar-divergent orientation.

Almost all of Romania's rivers are tributaries of the Danube due to the latter's peripheral position and its course along its lower basin. Under these conditions 95 per cent of Romania's territory (221,670 sq km) belongs to the Danube's hydrographic basin, the other five per cent being drained by some small rivers of eastern Dobrudja which flow directly into the sea.

A record of the country's watercourses in the Cadastre of Romania's waters reveals that there are some 4,295 rivers in this country whose reception basin exceeds 10 sq kms and whose length is greater than 5 km. The total length of these rivers is of 66,029 km, most of them (97 per cent, that is 4,159 rivers) are shorter than 50 km. Only 2 per cent of the rivers run between 50 and 100 km, one per cent between 100 and 500 km and 0.11 per cent exceed 500 kms in length (the Danube, Prut, Mureș, Olt and the Siret).

The density of the hydrographic net — for the 66,029 km representing the overall length of Romania's watercourses — is of 0.27 km/sq km. If one were to take into account also rivers shorter than 5 km, the overall length of the hydrographic net would be of 115,000 km and its density of 0.49 km/sq km.

Because of the relief, lithology, climate, vegetation, etc. diversity, the density of the hydrographic net shows marked territorial differences. Thus in the mountain zone the values recorded range between 0.50 — 1.20 km/sq km due to the 500 — 1,000 m relief energy and the annual precipitation rate of 800 — 1,600 mm. These values are lower in the hills and plains so that in the Romanian Plain and southern Dobrudja there are, as already reported, some areas where the draining network is absent at the surface.

The gradual fall of relief energy from the centre to the country's periphery stamps the longitudinal profiles of rivers. They slope down with 150 — 300‰ in the mountain zone, 5 — 10‰ in the sub-Carpathian and piedmont zones and 0.5 — 1‰ in the plains. In some sectors the small longitudinal profiles of rivers may display rapids generated by the lithological variation of the bottom (2 — 5 m small falls). A varied, step-like longitudinal profile shows also the rivers whose evolution is more complex, viz. epigenetic transversal valleys or antecedents (the Mureș in the Toplița-Deda and Deva-Zam gorges, the Olt in the Tușnad and Turnu Roșu-Cozia gorges, the Jiu' in the Livezeni-Bumbești gorge, and the Danube at the Iron Gates).

From the direct and indirect observations made on the flow of Romania's inland rivers, the total average flow of these rivers (except for the Danube) can be estimated to some 1,100 m³/s. This amounts to in annual volume of 34.8 billion m³ water or a specific average flow of some 5 l/s/sq km.

If the amount of water flowing into the Danube is added (an average of 5,400 m³/s, that is some 170 billion m³/year), then the water volume is substantially increased.

The lakes are numerous in respect to number (some 3,450) but they cover a rather small surface viz. 2,620 sq km in all (i.e. 1.1. per cent of Romania's territory). The greatest water surface in the country is formed by the Razim-Sinoie lake complex (some 860 sq km). However, these

lakes being located at the Black Sea shore, with the consequent possible penetration of the sea water, have salmastrian and even saulty waters.

Because of these conditions the water volume accumulated in the lakes which can be used for drinking water, industrial water, irrigations, etc., is rather small. The vast majority of fresh water natural lakes are used only at a local level for irrigation or pisciculture. Mountain lakes are turned to account only for tourist ends.

The full swing of Romania's economic development in the last few decades led to greater water requirements in industry, agriculture, electric power, etc., with the consequent formation of new water accumulations. Thus, in the valleys of small rivers in water-depleted areas (the Romanian Plain, the Moldavian Plain, the Transylvanian Plain) numerous ponds were created for irrigation and pisciculture. In the highland area larger storage lakes are being formed for the hydropower network (Izvorul Muntelui on the Bistrița, Vidraru on the Argeș, Vidra on the Lotru, the Iron Gates on the Danube) or for the water supply net (Poiana Uzului, Paltinu-Doftana, Cinciș-Cerna, Strimtori-Firiza, on the Birzava river, etc.).

On the other hand, a series of natural lakes located in the water-plains of larger rivers (especially in the Danube floodplain, and the water-plains of some more important rivers in the Romanian Plain and western Plain) were drained. The drainage of these lakes and of other excessively humid areas throughout the country rendered some 170,000 hectares arable.

The subterranean waters and the springs are not evenly spread over Romania's territory.

In the mountain zone subterranean waters are located in hillside wastes, in the cracks of dense rocks, in karstic interstices, etc., because of which the sheet is discontinuous. A continuous sheet of large quantities of underground waters is found in the alluvial deposits of rivers and in the piedmont belt. High amounts of water with organoleptic properties are produced by limestone massifs, yet these waters should be carefully exploited only on condition that underground supply and drainage routes are well known.

When the subterranean waters run across soluble salts or gases (postvolcanic manifestations) they get mineralized and form important sources of waters with various curative properties.

In the lowlands there prevail the continuous horizons of underground waters occurring at various depths in terms of the impervious layer which makes up their bed. In these places they represent the major water supply source for the human settlements.

At the level of the whole country underground water reserves are estimated at an average a volume of 8.5 billion m³/year, of which some 4.5 billions could be used for economic purposes.

At present, the principal underground water catchments are: in the dejection cone of the Prahova valley and the corresponding levantine deposits for the water supply of the town of Ploiești; in the Frătești flint and Dimbovița, Argeș, Colentina and other fluvial deposits for the water supply of the town of Bucarest, in the fluvial deposits of the Moldova river for the water supply of the town of Iași (the Timișești catchment) and Roman, in the dejection cone of the Putna (the Suraia catchment).

for the water supply of the towns of Galați and Brăila, in the Mureș river cone for the water supply of the town of Arad, in the fluvial deposits of the Someș, Tirnava, and the Criș rivers for the water supply of the towns of Cluj, Sighișoara and Oradea, respectively, in limestones catchments of Caragea Dermen, Cișmea, Biruința, etc.), of the towns of Craiova (the Izvarna catchment) and Tîrgu Jiu (the cuncu catchment) etc.



This brief presentation of the main forms of water distribution in Romania and the possibilities of turning them to account emphasizes the fact that, under natural conditions, the largest quantity of water that can be used for the needs of the national economy is supplied by rivers. This water source, however, shows both space and time variations.

As a whole, the amount of precipitations fallen in the course of one year exceeds by far the amount of evaporated water (at heights over 500 m in the east and south, and 200 m in the west of the country) leading to an excess of humidity. Below these altitudes there is an inverse precipitation/evaporation ratio, the latter factor being much higher the humidity balance is negative.

In conclusion, the multiannual average flow registers different values. In the mountains the flow values range between 400–1,000 mm/year as compared to the tableland and lowland area, where it falls below 25 mm/year (the Romanian Plain, the Moldavian Plain and the Dobrudja). The rivers running across the flat water-depleted areas lose part of their waters through evaporation and infiltration; the waters originating in these zones have a semipermanent character.

The phenomenon of the decrease of the average flow is particularly evident in case of a hydrographic basin that covers all relief units. On analysing, for example, the specific average flow of the Argeș basin (l/s/sq km), one can see that the value recorded in the high zone of the Făgăraș Mountain (2,000–2,500 m) is of 40–50 l/s/sq km; at Curtea de Argeș (sub-Carpathian area) of 20 l/s/sq km; at Pitești (piedmont area) 15.7 l/s/sq km; and at Budești, in the flat land area near its mouth at the Danube, of 5.1 l/s/sq km.

Another particularity of the hydric regime specific to the continental temperate zone prevailing in this country is also the non-uniform distribution of the flow volume in the course of one year. For most rivers the highest volume of water flown is in spring (between 30–60 per cent of the annual amount, even up to 80 per cent in some basins) while in summer, during the optimal development period of vegetation, it represents only 15–35 per cent.

Due to the continental temperate climate, in droughty years, the flow volume falls down to almost 50 per cent of the normal annual mean and even below it in summer.

Another feature specific to rivers in humidity-deficient geographical zones (Moldova, the Dobrudja, the Romanian Plain) is the torrential character of the flow. In these zones the maximum flow may reach values from 20 to 100 times higher than the average ones.

As previously shown, the volume of the country's inland rivers annual flow is of 34.8 billion cube metres (some 1,100 m³/s) (Table 1).

Table 1

Romania's water reserves

Hydrographic basin	Volume (mil. m ³)		Monthly flow (m ³)	
	Average year	Droughty year (95 % assurance)	Maximum 1 % assurance	Minimum VI—VIII 80 % assurance
The Upper Tisa	1,802	998	2,525	17.50
The Someş—Crasna	3,800	1,804	4,010	30.48
The Three Criş rivers	2,584	1,269	2,830	12.91
The Mureş—Aranca	4,932	2,855	2,420	54.00
The Bega—Timiş—Caraş	1,618	809	2,005	9.60
The Nera—Cerna	1,166	698	1,750	8.17
The Jiu	2,769	1,833	1,970	18.00
The Olt	5,040	3,300	(4,090)	70.00
The Vedea	363	97	1,070	1.23
The Argeş	1,957	1,125	1,940	23.20
The Ialomiţa	1,319	902	890	17.50
The Siret	5,860	3,700	4,500	85.00
The Prut (Romanian section)	1,290	820	(800)	16.10
The small tributaries of the Danube	259	102	1,355	0.83
The small tributaries of the Black Sea (eastern Dobrudja)	35	15	1,130	0.23
Total minus the Danube	34,794	20,323	33,285	364.75
The Danube at the entrance in Romania	170,108	120,875	16,450	3.120

By basins, the distribution of this volume reads : approx. 400 m³/s the Tisa basin, approx. 700 m³/s the Danube tributaries and 5 m³/s the Dobrudja rivers which run directly into the Black Sea. Of the total water flow volume, 84 per cent originates from the Carpathian and sub-Carpathian zones, the remaining part being covered by lowlands and highlands (the Transylvanian Basin, some 75 m³/s, the Moldavian Plateau some 35 m³/s) the Romanian Plain and the Gaetic Piedmont some 60 m³/s, the Tisa Plain and the western piedmonts some 35 m³/s).

If one were to take into consideration the water flow of inland rivers this would amount to 1,862 m³/year/per capita. On comparing this volume to that of other European countries — France, Italy (3,000—5,000 m³/year/per capita), Austria and Switzerland (5,000—10,000 m³/year/per capita), Finland, Norway and Sweden (over 20,000 m³/year/per capita) — one could see that Romania's water volume per capita is small. If the Danube water flow and that of subterranean waters is added, then the quantity of water per capita is much higher. However, the Danube's waters can be taken into account only under certain circumstances as the river waters are under an international valuation regime.

On the ground of hydrological studies it can be assumed that the watercourses reported have, as a rule, a constant water regime, the yearly variations being compensated within a 5— or 10— year interval.

Yet, while water sources remain constant, society asks for their ever greater utilization.

Thus, before World War II, the total water volume used in Romania was of 0.8 billion m³/year, i.e. 50 m³/year/per capita, the installed hydro-power was of 50 MW, and only 18,000 hectares were irrigated.

After World War II, only in the period 1960–1965, the water volume used rose from 2.61 billion m³/year at the beginning of that Five-Year-Plan, to 6 billion m³/year by the end of it (1965), reaching 6.82 billion m³/year in 1967 which meant 355 m³/year/per capita. Of this water volume, 0.86 billion m³ were used for the drinking water supply of the population, 4.76 billion m³ for industry and pisciculture and 1.29 billion m³ for the irrigation of 380,000 hectares.

In 1970 the water volume used was of 10.10 billion m³ of which 1.54 billion m³ for the drinking water supply, 3.86 billion m³ for industry, 3.71 billion m³ for the irrigation of 878,000 hectares and 0.99 billion m³ for pisciculture (Table 2).

Table 2

Dynamics of water requirements in Romania (Required volumes in billions m³)

	1950	1960	1970	1975	1980
Drinking-water	0.12	0.35	1.54	2.19	3.01
Industrial water	0.18	0.80	3.86	7.03	11.84
Irrigations	0.50	0.86	3.71	9.14	12.90
Pisciculture	0.40	0.60	0.99	1.20	1.70
Total	1.20	2.61	10.10	19.56	29.45

Of this total water volume 67 per cent was taken from inland waters and 33 per cent from the Danube. In these conditions, most of the inland river flows that could be used in their natural condition were completely valuted in 1970 (the actual utilizable stock being of 6 billion m³/year because the highest requirements coincide with the periods of low river flows). As a consequence, the formation of new storage lakes is imperative.

Among the possibilities of turning to account the water sources, the utilization of their hydropower potential is of primary importance. Utilization of rivers for electric power has been fully developed after World War II. Because of the morphohydrographic conditions of the river bed and the particularities of the flow, the hydropower potential of Romania's rivers is not high. Thus, as against the hydropower potential yielded by precipitations (0.97 GWh/year/sq km or 230,000 GWh/year), the superficial flow yields only 0.38 GWh/year/sq km or 90,000 GWh/year.

By comparing the flow potential of this country (0.38 GWh/year/sq km) to that of Switzerland (2.5 GWh/year/sq km), Austria (1.82), Norway (1.72), Italy (1.13) and Yugoslavia (0.87), it can be seen that Romania's is rather low, nearing the average values recorded throughout Europe (0.37 GWh/year/sq km) and exceeding to a certain extent those recorded all over the earth (0.31 GWh/year/sq km).

The linear hydropower potential of Romania's rivers, including that of the Danube on Romanian territory, calculated for a watercourse length of 24,400 km is of 70,000 GWh/year (rivers whose linear potential is below 100 km/km were not taken into account). The river sectors whose linear potential exceeds 500 kw/km amounts to some 3,400 km totaling 25,950 GWh/year, those over 1,000 kw/km amounting to 12,000 GWh/year.

With a view to valuating Romania's hydropower potential and to supplying drinking and industrial water, some 42 major storage lakes the total volume of which is of some 2 billion m³, and also 11 derivations with a total length of 130 km, were created until 1970. In these conditions, much of Romania's water requirements are covered, only the regions located on the middle and lower basins of smaller rivers (the Ialomița, Buzău, Birlad, Vedea, Jiu, the three Criș rivers, etc.) are still water deficient.

Considering the development rate of the forces of production and the steady increase of the living standard, water requirements in 1970 and 1980 would be of 19.56 billion m³ and 29.45 billion m³, respectively*.

Most of these amounts will be used for irrigations (9.12 billion m³ in 1975 and 12.90 billion m³ in 1980) and industry (7.03 billion m³ and 11.84 billion m³, respectively). It should be remembered that until 1975 the irrigated lands will cover 1,250,000 hectares more, totaling a surface of 2,100,000 hectares (40 per cent of 5,300,000 hectares representing the country's irrigable surface).

With a view to ensuring the supply of ever higher water requirements, it is necessary, as already said to form new storage lakes.

To this end, the provisions of the national plan for the management of Romania's water sources include the formation of 64 big storage lakes with a total volume of 2,271 billion m³ and a great number of local storage lakes totaling a volume of 120 billion m³. Most of these storage lakes (48) will have a complex character and eight of these will be devoted exclusively to hydropower uses (Table 3).

Table 3
Forecast of water accumulations up to 1975

Function	Number	Volume (millions m ³)			
		real	useful	energy	attenuation
Complex accumulations	48	1390	1275	—	115
Accumulations for attenuating the floods	8	172	69	—	103
Zonal accumulations	*	120	80	—	40
Hydroenergetic accumulations	8	709	*	602	*

*These figures do not include the water volumes used for the hydropower net which may be recovered and utilized in other sectors, especially for irrigation.

Half of the useful volume stored (760 billion m^3) will be appropriated to the great irrigation systems that are being formed in the Mostiștea valley and near the Razim-Sinoie lake complex.

As a result of these accumulations, of the extension some derivations and of the operation of numerous purification plants through which part of the water used will be recovered, in 1975 a total water volume of over 19 billion m^3 , that is a flow of some 2,000 m^3/s , will be put to account. Of this flow, 80 m^3/s will be used for the supply of drinking water, 280 m^3/s for the supply of industrial enterprises and 1,600 m^3/s for irrigations (in the period of vegetation).

These hydropower installations will yield an installed power of 2,940 MW (of which 1,050 MW at the Iron Gates) the average power output being of 9,000 GWh/year (31 per cent of the appropriated potential).

In the period 1971–1975 pisciculture is planned to cover some 57,000 hectares more, totaling 147,000 hectares in all.

The steady development of the national economy and the rise of the living standard presupposes the corresponding increase of water requirements. Therefore, the main objectives of the 1976–1985 long-term plans are: a 100 per cent supply of drinking water for the urban population, and a 14 per cent supply for the rural population; extension of irrigated areas by some 2 billion hectares; development of the hydropower output so that 72 per cent of the country's hydropower potential could be used (installed power 7,000 MW and an average output of 21,000 GWh/year); piscicultural appropriations totaling 182,000 hectares.

The total water volume required to meet these needs will reach some 40 billion m^3 in 1985.

The water supply for industry (44 per cent) and irrigations (42 per cent) will have the highest weight. The necessary water requirements will be supplied by 137 new complex storage lakes whose gross volume will be of 9,500 billion m^3 . Some 20 new storage lakes with a volume of 5,300 billion m^3 will be created mainly for hydropower uses. Due to these works in 1976–1985, the installed power of hydropower stations will increase by 4,400 MW, and the power output by 11,800 GWh/year so that by 1985 there will be 7,400 MW and 21,000 GWh/year, respectively.

The data reported in this paper emphasizes the fact that the full swing of the national economy and the increase of the population ask for scientific research to focus its interest on the knowledge and inventory of water sources, the more so as these sources are rather limited.

REFERENCES

- BREIER A. (1971), *Resursele de apă ale Dobrogei și folosirea lor*. In: Studii și cercetări de geografie aplicată a Dobrogei, Constanța.
- GĂȘTESCU P., BREIER A. (1969), *Les lacs artificiels de la Roumanie*. Rev. roum. Géol., Géophys. Géogr. Sér. Géogr., 13, 2.
- HOSSU GH. (1964), *Resursele de apă*. In: *Dezvoltarea economică a României 1944–1964*, pp. 172–181, Ed. Academiei, Bucharest.

- MATEESCU C., BOISNARD J., PĂRVULESCU C. (1969), *Problemele actuale ale gospodăririi apelor în Republica Socialistă România*, Hidrot., gosp. apelor, meteorol., **14**, 2.
- ✱✱ *Cadastrul apelor din R.S.R. Sinteza cadastrală pe anul 1970*, MAIAA, Consiliul Național al Apelor, Bucharest.
- (1971), *Studii de economie a apelor*, MAIAA, ISCPGA, Bucharest.
- (1971), *Riurile României — Monografie hidrologică*, MAIAA, Institutul de meteorologie și hidrologie, Bucharest.

Received October 10, 1971

*Laboratory of Hydrogeography
Institute of Geography
Academy of the Socialist Republic of Romania
Bucharest*

A NEW CARTOGRAPHIC METHOD FOR THE REPRESENTATION OF MAXIMUM PRECIPITATION AMOUNTS IN THE COURSE OF 24 HOURS

by ELENA TEODOREANU

Prin analiza și transpunerea datelor de la peste 600 posturi pluviometrice într-o nouă reprezentare cartografică, s-a întocmit o hartă cu cantitățile maxime de precipitații în 24 ore, repartizate pe praguri de valori cuprinse între <70 mm și la >200 mm, pe cele patru anotimpuri. Această hartă scoate în evidență o distribuție pregnantă a acestor cantități în sezonul cald pe tot teritoriul, valorile maxime înregistrate iarna fiind predominante în partea de sud-vest a țării. Cantitățile maxime absolute se repartizează în general în jumătatea de sud a țării, în special pe pantele sudice ale Carpaților, în culoarele intramontane, în cîmpia română dintre Olt și Argeș și în Dobrogea.

Analiza maximelor anuale la unele posturi pluviometrice întregesc posibilitățile de sintelizare oferite. Harta se face astfel utilă ca un instrument de comparație generalizare și individualizare pentru tot teritoriul României.

Maximum precipitation amounts registered in the course of 24 hours are an apparently random meteorological event, wholly unpredictable as to its localization in space and time. With lower amounts of precipitations as registered daily by various pluviometric stations in the course of longer or shorter lapses of time, this phenomenon shows a certain uniformity, its effects being usually small, except in case of some particularly heavy rainfalls when although the quantity of water is not very great, yet the time interval in which they occur lasts some minutes only so that the rain is very heavy. This is a different problem, however, and is not being dealt with in this paper.

From time to time, in the recordings of daily precipitation maxima, there appear some values which exceed the monthly, or occasionally, annual rainfall index, their direct result being a calamity: floods, landslides, etc.

Because of the particularities of this variable, it has always been difficult to graphically represent its distribution and when it was represented it did not offer a space picture of the phenomenon though the level of graphic information might have been very accurate (i.e. for each

pluviometric station we had a fraction whose numerator showed the amount of precipitations and the denominator their occurrence time).

It is for these reasons that we tried to find a graphic representation by which comparisons, generalizations or individualizations could be directly made. We chose a graphic method based on circles which, by four different hachures, marked the four seasons when maximum precipitations occurred. The size of the circle was proportional to the amount of precipitations (mm). A first criterion for the selection of the 1,200 pluviometric stations, whose precipitation maxima were recorded in the course of 24 hrs at different periods of observation, was the time interval of observations, viz. stations where such recordings were made over a 40-year period in the interval followed by us 1896—1970. The stations which made these observations over a shorter interval of time, but had the chance to record periods of unusual rainfalls, namely. 100 mm/24 hrs, were also shown on the map. In addition, the precipitations that fell in winter and amounted to over 60 mm were also marked, irrespectively of how old the station was, so that the map could put into evidence the predominance of this phenomenon in the south-west of Romania as a result of the prevailing cyclone-like circulation in this zone.

This mode of representing on the Chart of Romania the data provided by some 600 pluviometric stations revealed some interesting aspects (Fig. 1 A).

It is clear that the season most propitious to heavy rainfalls is summer, i.e. 71.2 per cent as against the other seasons; then follows autumn with 14.4 per cent and spring with 12.4 per cent (in May mostly). In winter there are but a few stations that record maxima and these are located, as already reported, usually in the south-west of Romania. While in spring it rains, as a rule, westwards, in winter highest precipitations are recorded eastwards, these being more frequent and heavier in the eastern half of this country.

As regards the distribution of precipitation maxima by the quantity fallen in the course of 24 hours, the chart points to the southern part of Romania as a zone mostly affected by this phenomenon; the southern slopes of the Carpathians and the sub-Carpathian zone in the bending area, the flatlands between the Olt and the Middle Basin of the Ialomița as well as the Dobruja. These maxima are produced by the dynamic circulation of air masses over the territory of Romania which lies at a crossing of influences: the Mediterranean cyclones and the Azore and the Siberean anti-cyclones. This would account for the greater number of stations with maximum recordings in the Romanian Plain and Moldavia and for some remarkable quantities of rain that fell in the intra-montane passes: Rucăr—Bran (at Fundata 306.0 mm), the Prahova pass (at Timișu de Jos 161.7 mm), Mureș-Tîrnava (at Frina-Medias 170.0 mm, Șura Mică, 179.9 mm and Deva 262.4 mm).

It is in Dobruja that the high temperatures in summer and in the early fall even generate strong convective currents; also the masses of air, the cyclones and the atmospheric fronts meeting no barrier on their way make the maximum absolute values for the whole country to be recorded here. Thus we have 530.6 mm at C. A. Rosetti in the Danube

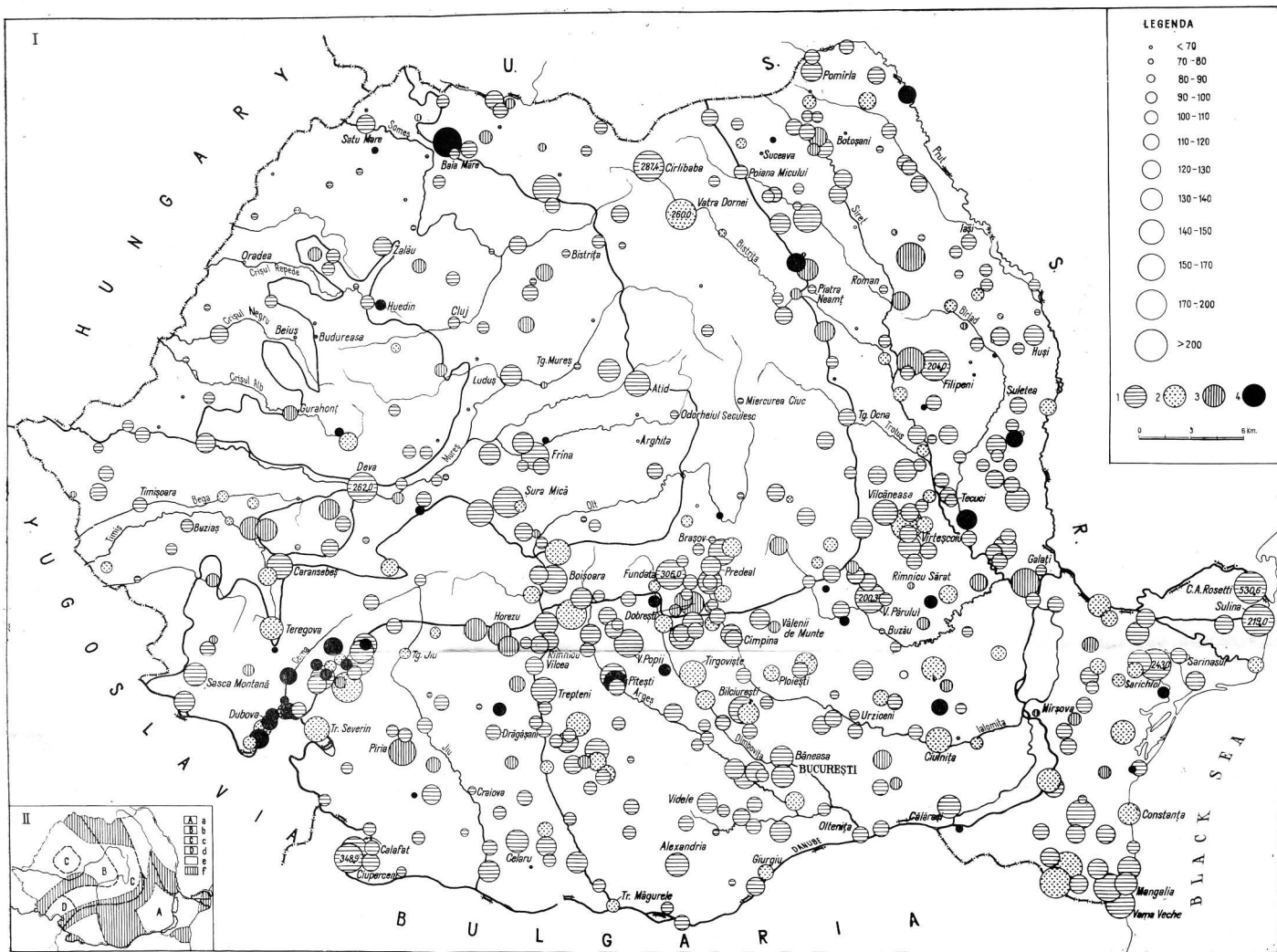


Fig. 1. - I. Distribution of absolute maximum precipitation values over Romania's territory in the course of 24 hrs: 1, summer; 2, autumn; 3, spring; 4, winter. II. Chart of regions with various absolute maximum precipitation values in the course of 24 hrs: a, region with highest precipitation maxima in the course of 24 hrs; b, region with highest precipitation maxima in the course of 24 hrs; c, mountain zone (few pluviometric station); d, region where

maxima in the course of 24 hrs; e, mountain zone (few pluviometric station); d, region where maximum values are recorded especially in winter; e, lower maximum amounts of precipitations in the course of 24 hrs; f, highest amounts of precipitations in the course of 24 hrs.

Delta, this value being twice that of the annual amounts in this place (359.0 mm). At the same time (August 29–30, 1924), at Sulina, located some kilometres farther east, there were registered 219.2 mm. In the south of Dobruja, at several pluviometric stations the values recorded along the years exceed 150 mm.

Analysing the chart, one could see that remarkable amounts of rain fell in Oltenia and the hills of Walachia (at Trepteni, 162.0 mm, Valea Popii 189.5 mm, Boișoara 160.0 mm), in the Romanian Plain (at Calafat 194.0 mm, Bîlcîurești 190.0 mm, Ciuperceni 348.9 mm), in the Bending area of the sub-Carpathians (Vîlcăneasa, 199.5, Valea Părului 200.3 mm, Virteșcoiu 185.0 mm) and also in the north of Romania (Vatra Dornei 260.0 mm, Cîrlibaba 280.4 mm).

Since this element is differently shown on the chart for the various regions of Romania, we have chosen some pluviometric stations characteristic of each region, following the maximum annual precipitations that fell in the course of 24 hrs. during the years 1961–1969 (Fig. 2).

It can be seen that in Transylvania, where in general maximum amounts are not too high (they quite exceptionally exceed 120 mm, and even more seldom 150 mm) the annual maxima of rains fallen in the course of 24 hrs is rather even and depressed (20–60 mm) (c). It should be remembered that in the year 1970 when the May floods affected almost all of Romania's territory, but especially Transylvania, the maximum values recorded within 24 hrs exceeded the multiannual maximum only in two localities (Baia Mare 90.0 mm as against the former 68.0 mm and Bistrița 89.0 mm as against 75.9 in the past). It should be noticed that these values are not unusual if compared to other maxima registered in this country along the years. In this case the value of the maximum precipitation amounts within 24 hrs was not conclusive because the rains of May 11–13, 1970 did not exceed 100 mm/day, but they did

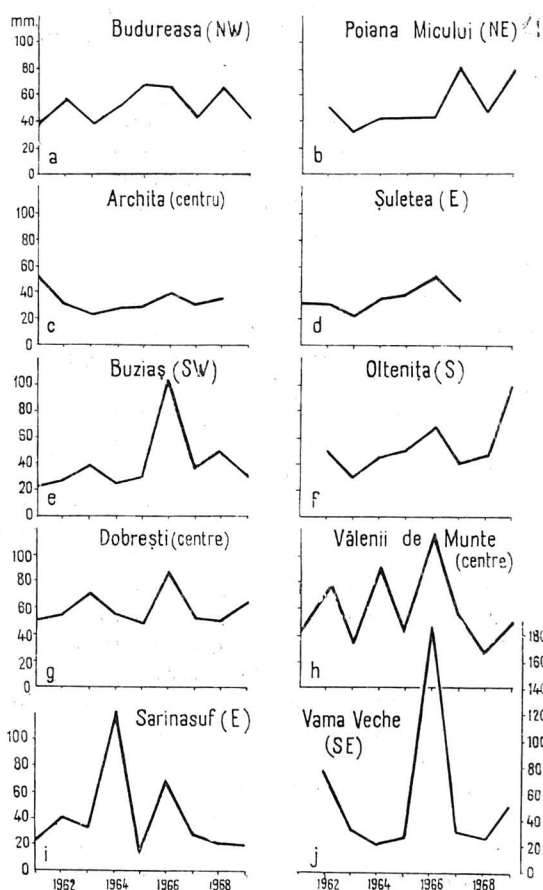


Fig. 2. — Maximum annual precipitations in the course of 24 hrs (1961–1969).

exceed 200 mm within 3—4 days which, added to the other conditions (much snow in the mountains, sudden melting due to the high temperatures at the beginning of May, the water-soaked soil, etc.) led to the catastrophic events registered in the Someș, Mureș, and other valleys. Other pluviometric stations in Bihor (*a*), or Dimbovița (*g*) registered also low variations but high values (40—80 mm). It might be interesting to note the variations of the curve for the Prahova county: variable values but high amounts, every 2—3 years (over 80 mm). In Dobruja the diagrams show very great yearly variations (20—100 mm) (*i*) (*j*). All these observations stand proof to the variability of daily maximum precipitations in various regions of Romania as shown also by the chart of maximum precipitation amounts in the course of 24 hrs. They made us attempt to synthetize the specific features of these regions in respect to season and the yearly variation of maximum annual precipitations (Fig. 1 *B*).

A final remark. The chart, as it is, might suggest that in the south of Romania the net of stations is denser than in Transylvania, for instance. This, however, is only apparently due to the mode in which the pluviometric stations were selected, as previously discussed in this paper (stations with over a 40-year period of observation, or stations with shorter periods, but where precipitations over 100 mm were registered etc.

In Transylvania there appear to be fewer stations for the same surface area as compared to the other regions of this country, because some of the stations with values < 70 mm are not shown on the chart, the values being low and liable to being exceeded any time. Besides, we are faced also with an optical illusion caused by the wider surface of the circles for the other regions. Only in the mountain zone the density of stations is lower but the stations which do exist give us an idea of the maximum amounts of precipitations in the course of 24 hrs, which though great are not absolute maxima as are the values recorded by stations located at lower altitudes. Nevertheless, the varied density shown on the chart attests once again the different condition of showers or steady rainfalls in the daily regime of precipitations.

The chart of maximum amounts of precipitations in the course of 24 hrs, worked out by the method reported herein, has the advantage of synoptically presenting several characteristics of this climatic element in its distribution over Romania's varied territory (high maxima in the south of the country and lower ones in the other zones; marked frequency of maxima in summer throughout Romania's territory; in autumn maxima are recorded eastward and in spring westward, with lower and less frequent amounts in winter, occurring mostly in the south-west of Romania, etc.).

Generalizations of the phenomenon over wider areas, as well as recording of some unusual local phenomena, may be a subject for future detailed investigations in the general air circulation which generated them.

The chart points also to the regions where the high daily precipitation maxima may produce changes in the landscape, contributing to the formation and extension of the degradation of soils or to the abnormal

variation of river beds. Consequently man's intervention should be greater to reduce the losses that might be produced by unusual rainfalls.

This new cartographic method devised to represent maximum precipitation amounts in the course of 24 hrs, thus, obviously provides a basis for applied research.

Received December 20, 1971

*Laboratory of Topoclimatology
Department of Physical Geography
Institute of Geography of the Academy
of the Socialist Republic of Romania
Bucharest*



A GRAPHIC METHOD FOR THE GEOECOLOGICAL STUDY OF A TERRITORY

by OVIDIU TOMA

Este prezentată o metodă grafică pentru studiul variației în spațiu și în timp a principalelor elemente climatice în legătură cu unele componente ale peisajului geografic. Graficul întocmit are două axe de coordonate: axa orizontală reprezintă variația în spațiu, materializat prin altitudinea absolută, a elementelor componente ale mediului ambiant (formații vegetale, tipuri de soluri, forme de utilizare a terenului etc.), iar axa verticală reprezintă timpul, materializat prin lunile sau anotimpurile anului. În cadrul graficului, în funcție de cele două axe de coordonate, sînt trasate izolinii, reprezentînd unul din factorii climatici (temperatura aerului, precipitațiile atmosferice, umezeala relativă, nebulozitatea) care influențează direct asupra celorlalte componente ale mediului ambiant. Graficul face posibilă redarea și a expunerii față de radiația solară a elementelor de relief. Metoda de studiu preconizată este aplicabilă la orice teritoriu, dar mai ales la regiunile muntoase, caracterizate prin etajarea fenomenelor geografice. Ea se poate utiliza diferit, în funcție de scopul urmărit. Menționăm cazurile: întocmirea graficului în lungul unui singur traseu (fig. 1) și întocmirea graficelor pentru o rețea de trasee (cînd este necesară caracterizarea unui teritoriu mai întins). Principalul avantaj al metodei de cercetare enunțate, este că permite reprezentarea simultană, în mod concis și pe un spațiu restrîns, a unui mare număr de elemente geografice, contribuind la cercetarea geoecologică a unui teritoriu. Adresîndu-se geografilor, dar și altor specialiști, această metodă oferă un instrument de lucru util în diverse domenii de activitate ca: agricultura, silvicultura, construcțiile, transporturile și turismul.

The graphic representation of geographic phenomena has the advantage of providing a synthetical approach. For simultaneous reproduction of several elements of the geographic landscape it permits the direct observation of the existing interrelationships. It also has the advantage of creating a clear visual image.

The graph under discussion aims at concomitantly presenting the spatial and temporal variation of some climatic elements, their connection with the vegetation cover, soils, and land uses, etc. Depending on the complexity of the analysis, one may draw either climatic graphs alone, or bioclimatic and biopedoclimatic graphs, which may point to the relation-

ship between climatic elements, viewed in their monthly or seasonal stage, and the absolute altitude, vegetation cover, soil types, etc.

The first question to be solved for graph plotting is the choice of its transect. After a preliminary study of topographic conditions and the way environment elements are distributed in space, a transect is chosen and the necessary data collected for graph construction. The transect is chosen, on the one hand, according to the aim of the respective investigation and, on the other hand, depending on the way orographic elements are distributed (or on the complexity of geoecological elements). For instance, if the selected territory has a large area, the chosen transect will be chosen so as to give a representative cross section of territory; thus it will be possible to generalize from the findings. To illustrate this, we have chosen a transect in the territory of Romania, with north-south direction (Fig. 1). The transect crosses the main relief units of this territory with its vegetation and soil cover from the Burnaz plain, in the south, through the ridges of the Făgăraș mountains to the highest peaks of the Rodna mountains, in the north.

The graph is made of a series of isolines based on two coordinate axes. The horizontal axis represents spatial or the altitude intervals defining either relief units or biopedoclimatic stages, etc.; the vertical axis represents time or months and seasons, chronologically differentiated. The size of altitude intervals is thus established so as to involve the main geomorphological units, existing along the selected transection. Depending on the values of these altitude levels, inscribed on the horizontal axis of the graph, the altitude distribution may be determined for different vegetation zones, types of soil and land use, etc. In figure 1, the horizontal line records on parallel bands the altitude zones, the vegetation zones and the soil types and the vertical axis includes the months. Perpendicular lines delimiting the spatial and temporal intervals should form a network of squares. Isolines present the space and time variation of a certain climatic element (e.g. in figure 1 I, the average monthly temperature and in figure 1 II the average monthly amount of precipitation). Besides altitude intervals, the parallel axis at the base of the graph records the degree of the ground exposure to solar radiation (Fig. 1 A).

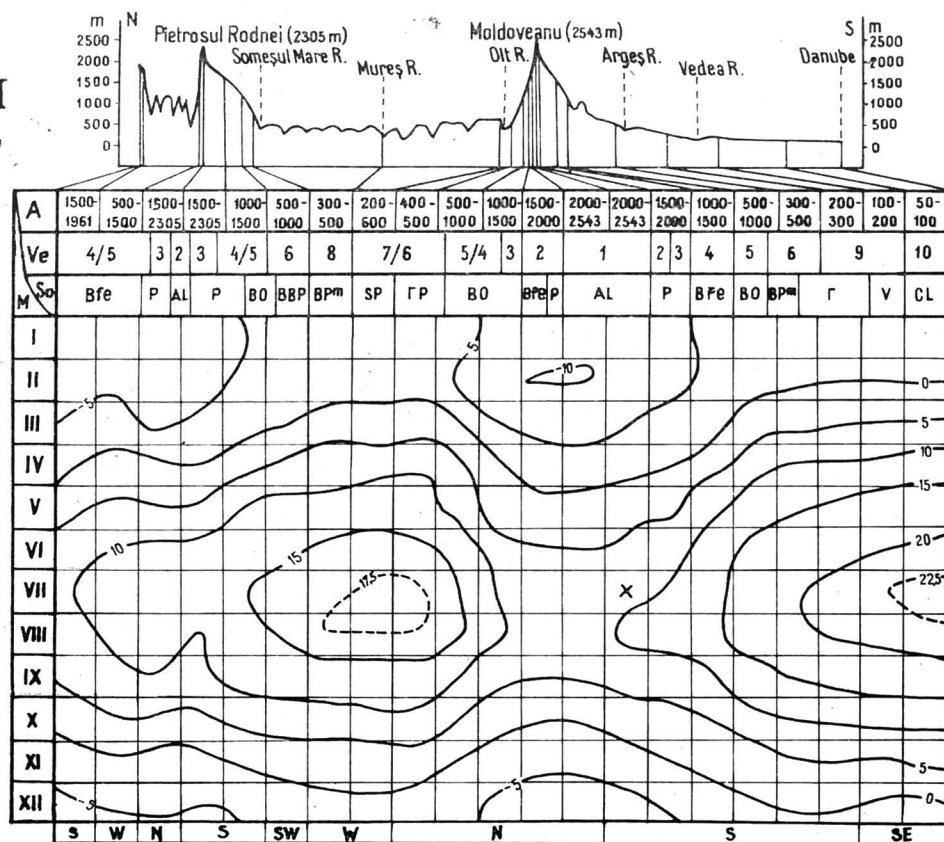
Isolines may illustrate the spatial and temporal variation of the main climatic elements: air temperature, precipitation, cloudness, relative humidity, etc.

Isoline equidistance is established depending on study requirements. The aim is to uniformly cover the graph space with the isoline network. Isolines will be completed, if necessary, with secondary isolines, graphically distinguished from the others. In figure 1 I, the equidistance of 5°C was established for air temperature and in figure 1 II, the equidistance of 20 mm for precipitation (Fig. 1 B). Figure 1 I points to the presence of supplementary isolines of 17.5°C and 22.5°C, completing the picture of summer temperatures in the Transylvanian plateau and in the southern part of the Romanian Plain, respectively.

Isolines are drawn using the interpolation method, on the basis of the established equidistance.

In parallel with the horizontal axis on which altitude zones are recorded, intervals are recorded representing the biopedoclimatic zones

I



II

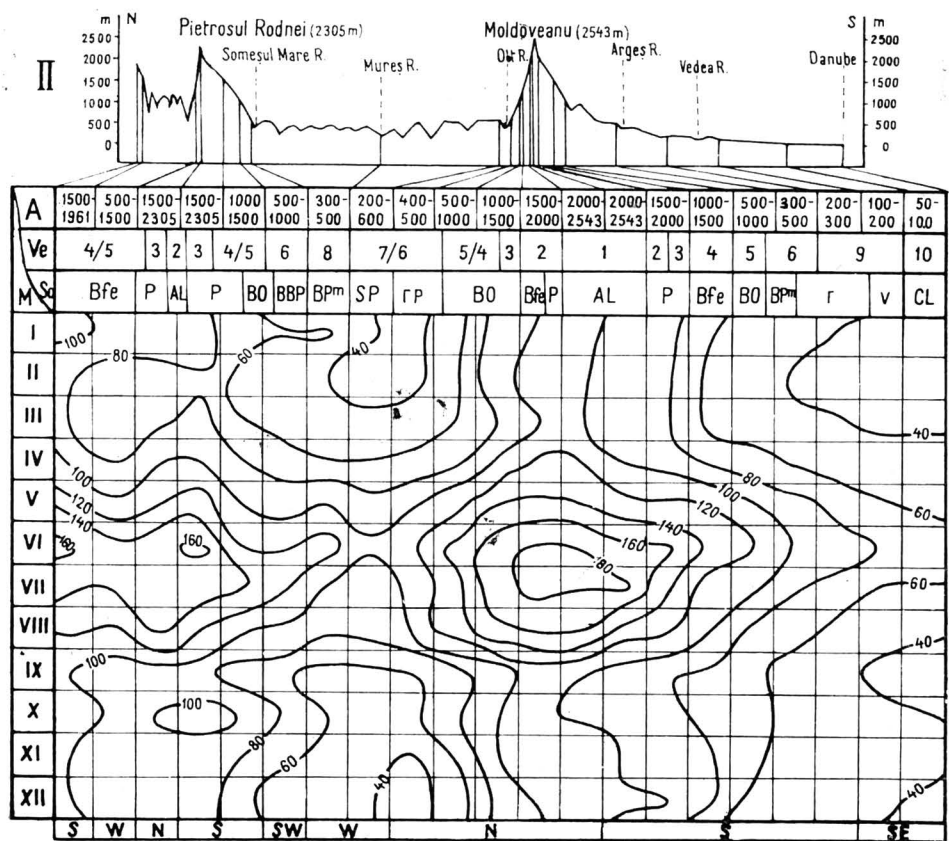


Fig. 1. — Geocologic graphs along a north-south transect in the territory of Romania. I, Air-temperature (°C). Monthly mean temperature. II, Atmospheric precipitation (mm). Monthly mean rainfall amount.

Symbols: M = months; A = altitude; Ve = = vegetation formations; So = soil types; N = northerly exposure; S = southerly exposure; W = westerly exposure; SE = south-easterly exposure; SW = south-westerly exposure. **Isoline equidistance:** air temperature = = 5°C; precipitation = 20 mm.

Vegetation formations: 1, Alpine meadows. Formations: *Cariceion curvulae*, including *Juncion trifidi*. Secondary formations: *Nardus strictae alpinum*. Formations of dwarf shrubs: *Salix herbacea*, *S. reticulata*, *S. vetula*, *Vaccinium uliginosum*; *Loiseleuria procumbens*, *Dryas octopetala*. 2, Subalpine glades and shrubberies. Formations: *Juniperus sibirica* and groups of *Alnus viridis*; *Pinus montana* and subalpine glades with *Picea excelsa*; *Pinus cembra* and *Larix decidua*; *Rhododendron kotschy*. Secondary formations: *Nardion strictae*; *Agrostideto (rupestris)*; *Festucion supinae*. 3, Forest of boreal resinous trees; Formations: *Picea excelsa*. 4, Forests of mixtures of beech, fir-tree and spruce-firs. Formations of mixtures of *Fagus sylvatica*, *Abies alba* and *Picea excelsa*. 5, Beech woods; Formations: mountainous *Fagus sylvatica*. 6, Beech woods; Formations hill *Fagus sylvatica*. 7, Oak woods. Associations of *Quercus petraea*, *Q. dalechampi*, *Q. polycarpa*. 8, Mesophilic oak woods. Formations of *Quercus robur*. 9, Thermophilic submesophilic oak woods. Formations of mixture of *Quercus cerris* with *Q. frainetto*. 10, Forest steppe vegetation. Formations of *Quercus pedunculiflora*.

Soil types: AL = humus silicate soils of alpine meadows and podzol humus silicate soils; P = humus ferriilluvial podzols and brown sub-alpine meadow soils; Bfe = brown podzol soils (ferriilluvial), acid brown soils, locally brown podzol soils (ferriilluvial); BO = acid brown soils (oligomesobasic and oligobasic); BBP = brown, acid brown and podzolic brown clayey illuvial soils, locally clayey illuvial podzolic soils; BPm = brown podzolic clayey illuvial soils; SP = podzolic clay illuvial and podzolic brown clay illuvial soils; ΓP = surface water gley and gleyed podzolic clay illuvial soils (often with closed B subhorizont); Γ = surface water gleyed and gley podzolic clay illuvial soils (often with closed B subhorizont); V = black and brown clays, light poorly organic (vertisols); CL = leached chernozem, from slight and moderate to strong.

Data were collected from the Climatologic Atlas of the Socialist Republic of Romania (in Romanian), Meteorological Institute, Bucharest, 1966; The Map of the geocological regions of the Socialist Republic of Romania 1:1,000,000 scale, Institute of Geography Bucharest (not printed); The Map of the soils of the Socialist Republic of Romania 1:1,000,000, scale, Geological Institute, Bucharest, 1970.

or, independently, the main components elements of the vegetation zones, soil types, land use, etc. Figure 1 shows the main vegetation zones and soil types existing along the chosen transect (Fig. 1 C, D). Colours are recommended to obtain a clear visual image of the represented phenomena. Colouring may be carried out in several ways: by painting the isolines, the areas included between isolines, the intervals of altitude zones, vegetation formations, soil types, etc. or the time intervals representing months or seasons.

To permit a full identification of time and space distribution of the phenomena presented in the graphs, it is advisable to refer also to special profiles (geomorphological, biogeographic, biopedogeographic, etc.). These profiles are drawn in the upper part of the graphs, aiming at an accurate correlation of the elements from the profiles with those from the graphs. In fig. 1, graphs were completed with a geomorphologic profile, to show the topography through which the selected transect was drawn.

To obtain the general characterization of a given territory it is sufficient to construct a single graph, based on data obtained along a transect. Yet for a more detailed characterization of this territory, it is necessary to draw several graphs for several transects crossing the region.

With a view to using the results obtained by the method outlined analysis may take several forms:

a) the study of space (altitudinal) and time (monthly or seasonal) distribution of climatic elements. Starting from the configuration of isolines representing the climatic element shown in the graph, emphasis may be laid on the pattern of certain values within a selected time span;

b) the study of the monthly or seasonal variation of climatic elements within an altitude level, vegetation level, soil type, forms of land use, etc. Account may be taken of one of the elements recorded on the horizontal axis, e.g. a vegetation level and the values of the climatic element graphically represented are observed for a level throughout the year;

c) the study of the variation of climatic elements, related to the variation of altitude and exposure, within a month or a season. Taking as landmark one of the months or of the seasons, noted on the vertical axis, we may observe the values recorded for the graphically represented climatic element, along the studied transect.

In the case of graphs drawn for a network of transection or of graphs plotted for long transections, comparison may point to some specific characters of the different geographical regions. Geographical comparisons may involve numerous aspects, of which mention is due to: the comparison of the main relief units (e.g. in figure 1, the comparison between the Făgăraș mountains and the Transylvanian plateau, or between the former and the Romanian Plain, etc.), the comparison of different exposures (in fig. 1, e. g., the comparison of slopes with northerly and southerly exposure in the Făgăraș mountains or the comparison of slopes with southerly exposure in the Rodna mountains and in the Făgăraș mountains, etc.), the comparison of different months and seasons (in figure 1 I, for instance, differences may be observed between average temperatures in February and July, or between average temperatures in the spring and autumn months, from a place of the territory to the other, etc.) a.s.o.

The outlined method is applicable to any territory, especially to mountainous regions, characterized by the different altitudinal zones of geographic phenomena.

Graphs may concisely and simultaneously represent a great number of landscape component elements, in the conditions of a considerable economy of space and time. Thus, fig. 1 I presents the average monthly air temperature in direct relationship with the absolute relief altitude and the way of exposure to solar radiations. At the same time, the relation between the thermic regime and the main vegetation levels and soil types is presented. In their turn, these are mentioned depending on their altitude distribution within the transect for which the graph was plotted. In figure I II, the absolute relief altitude, the way of exposure to solar radiation, vegetation levels, and soil types are represented in relation to the mean monthly precipitation, permitting to grasp the mutual relations that occur between these elements. The complete analysis of graphs in figure 1 points to the differences existing in the thermal and rain regime, both within great relief unit — the Carpathian, the subcarpathian region, the Transylvanian plateau and the Romanian Plain — and between seasons. Any point on the graph expresses a consequence of the reciprocal interaction of the elements of the landscape crossed by the studied transection. Thus, in fig. 1, I point "x" sums up the following elements: in the Făgăraș mountains, on slopes with a prevailing southerly exposure, having the absolute altitude of about 2275 m, with Alpine meadow vegetation, involving as main formations *Caricion curvulae* including *Juncion trifidi*, as secondary formations *Nardus strictae alpinum* and as formations of dwarf shrubs: *Salix herbacea*, *S. reticulata*, *S. vetusa*, *Vaccinium uliginosum*, *Loiseleuria procumbens* and *Dryas octopetala*, developed on humus silicate soils of Alpine meadows and on podzol humus silicate soils, in July there is an average monthly temperature of about 9°C.

Graphs prepared according to the method outlined supply a rich documentation which may be used in addition to geographic studies, in several fields of activity: agriculture, silviculture, building, transportation and tourism. An accessible and useful instrument is thus made available to geographers and also to other specialists — biologists, pedologists, ecologists and specialists in territorial systematization.

Received November 3, 1971

Laboratory of Regional Geography
Institute of Geography of the
Academy of the Socialist Republic of Romania
Bucharest

CHANGEMENTS ACTUELS DANS LA TYPOLOGIE DES VILLAGES ROUMAINS

par VICTOR TUESCU

Clasificările mai vechi și mai noi asupra așezărilor rurale din România (avînd drept criterii de diferențiere : structura și forma, mărimea, dispersia, funcțiunile etc.), deși pornite pe căi diferite se pot îmbina în tipuri comune pe baza corelării criteriilor complexe. Toate criteriile rămîn valabile, luînd ca factor polarizator funcțiunea economică. Tipologia rezultată este geografică.

Dar în prezent se produc mari schimbări în aspectele satelor și în funcțiunile acestora, ca urmare a numeroaselor construcții moderne ce se înalță, prin mecanizarea producției agricole și eliberarea forței de muncă și ca urmare prin deplasarea forței de muncă de la sate spre orașe, fenomen corelat cu cel de rapidă urbanizare, iar acum în urmă adăugîndu-se și acțiunea de sistematizări rurale.

Prin acțiunile enumerate — spontane ori dirijate — tipurile de sate sînt în curs de modificare fundamentală. Nu doar schimbări de aspecte prin modernizarea locuințelor și a elementelor edilitare de ansamblu, nu numai îndesirea caselor în fostele sate răsfirate pînă la forma de sat adunat, nu numai contopirea satelor mici în sate mari cu dispariția unora (ex. fenomenul de dispariție al crîngurilor), dar chiar schimbări fundamentale în funcțiunile satelor prin apariția unui mare număr de întreprinderi industriale la sate (în 1330 de comune rurale din totalul de 2706 funcționează întreprinderi sau secții industriale), ori prin folosirea forței de muncă a satelor în construcții, servicii, prin navetism. În multe sate funcțiunea agricolă nu mai este primordială

Dar chiar funcțiunile agricole s-au schimbat ca și mediul înconjurător rural. Însemnate schimbări s-au produs în utilizarea terenurilor prin desecări și îndiguiri, prin extensiunea irigațiilor, prin ameliorarea și plantarea terenurilor degradate etc. Îndesirea rețelei rutiere moderne, amplificarea și extinderea influenței orașelor, extinderea fenomenului suburbanizării, individualizarea continuă a unor sate cu tendințe urbigene (49 devenite orașe la 1968, 335 propuse a deveni orașe pînă în 1990), iată elemente care schimbă sub ochii noștri în mod radical harta tipurilor de sate.

Tendința generală pare a fi micșorarea numărului de sate, cea de creștere în dimensiuni, de introducere a îmbunătățirilor edilitare la nivelul exigențelor contemporane, cu alte cuvinte, micșorarea contrastelor dintre sat și oraș. Rolul ce revine în această situație geografiei, etnografiei, sociologiei etc. este menținerea, în cadrul acestui flux al schimbărilor, a ceea ce este autentic și propriu fiecărei regiuni a țării.

Les travaux concernant le village roumain datent de la deuxième moitié du XIX^{ème} siècle, lorsque apparaissent des monographies de village avec un caractère géographique prononcé. Le prototype de cette étape de groupement analytique du matériel de base est représenté par les dictionnaires géographiques par départements parus au cours de la dernière décennie du XIX^{ème} siècle. Les premiers travaux concernant les types de villages sont publiés après la première guerre mondiale. A la suite des excursions interuniversitaires dirigées par Emm. de Martonne en 1921, on distingue le village de montagne *dispersé* en contraste avec le village *aggloméré* des vallées et celui *rassemblé* sur le plateau de Transylvanie, d'influence germanique. Dans ses réponses au questionnaire lancé par A. Demangeon au Congrès International de Géographie du Caire en 1926 concernant les types d'habitat rural, Vintilă Mihăilescu détermine la répartition en Roumanie des trois principaux types *morphologiques* de village différenciés antérieurement en Europe occidentale et centrale selon la densité des maisons et la structure interne de l'habitat : le village *éparpillé* ou *dispersé* de montagne formé par des exploitations isolées, entourées de prêtres et de pâturages (englobant, ci et là, de petits groupements plus denses qu'on appelle dans les Monts Apuseni *crînguri*), le village *rassemblé*, avec de très petits espaces entre les maisons, spécifiques des zones de plaine, par endroits, surtout en Transylvanie, les maisons y sont accolées, mur contre mur, et cette variante apparue sous l'influence de la minorité allemande mais adoptée par les Roumains, porte le nom de village *compact* ; puis dans une situation intermédiaire entre ceux-ci il y a le village *disséminé* de colline où prédomine la culture des arbres fruitiers et des vignobles, aux maisons entourées de jardins et même de petits guérets. Ce type intermédiaire était considéré comme le plus répandu en Roumanie. Certains chercheurs ont détaillé et complété ces types essentiels, par région (pour la Transylvanie, l'ouvrage de R. Vuia de 1938 est remarquable en ce sens).

Après la deuxième guerre mondiale on propose une nouvelle typologie des villages basée sur le critère de la *grandeur moyenne* (V. Tufescu, 1957), laquelle fait ressortir des catégories bien différenciées par rapport à la zone : *petits villages*, qui comptent moins de 500 habitants dans des zones de très anciennes formes d'union économique agricole libre (*obste*) sur le Plateau de Birlad et le Plateau Gétique ; *grands villages* avec 1500—6000 habitants le long du Danube, dans la Plaine de l'ouest et dans certaines dépressions sous-montagneuses (Braşov, Sibiu, Maramureş, etc.) et *villages moyens*, avec 500—1500 habitants dans les espaces intermédiaires. Plus tard, d'autres travaux ont également utilisé ce critère pour la classification des villages (plus récemment, nous citons Niculina Baranovski et Ioana Ştefănescu, 1970).

Un autre critère pour la classification des habitats ruraux est celui des *fonctions économiques* dominantes des villages (I. Băcănaru et collab., 1960) En prenant comme base la carte par zones de la production agricole, les auteurs ont différencié plusieurs catégories de villages : villages céréaliers et d'élevage (avec deux variantes), villages de cultures fruitières et d'élevage (avec un type spécial pour les vignobles), villages qui s'adonnent seulement à l'élevage dans la zone des prêtres et des pâturages de montagne, etc. On a fait à cette classification le reproche d'analyser les

causes, sans arriver à définir certains types, car la fonction crée la condition, elle ne représente pas (V. Mihăilescu, 1969).

On a encore ajouté d'autres critères de différenciation des villages : d'après *l'altitude* (E. Molnar 1957, T. Morariu et collab. 1968, Cl. Giurcăneanu, 1971), d'après *l'indice de dispersion* de Demangeon, ou bien avec des variantes de celui-ci, etc. A la suite de tous ces critères énumérés, dont seuls les deux premiers présentent des bases concrètes avec des caractéristiques visibles dans le site, l'impression s'est créée que certaines classifications sont de nature à exclure les autres. En réalité, on peut établir une certaine correspondance, un certain parallélisme entre les *types* qui résultent de l'application de ces classifications basées sur des critères uniques, contradictoires en apparence seulement. Une certaine structure de village correspond à une certaine fonction et celle-ci à certaines conditions dues au potentiel naturel, etc. Le village céréalier de plaine, à structure rassemblée, atteint de grandes dimensions dans les zones de contact (avec la plaine du Danube, ou les collines), et il en est de même pour les villages qui se trouvent aux pieds des montagnes. Par conséquent, il y a une corrélation étroite entre les catégories des différentes classifications simples. Leurs rapports sont de causes à effets : fonctions économiques, nature des lieux, structure de l'habitat, son étendue.

Le problème est de discerner lequel, parmi les critères simples énumérés plus haut, est celui qui polarise les autres. La nature n'est qu'un facteur potentiel de permanence qui peut être mis en valeur de toutes sortes de manières, la morphologie ainsi que l'étendue sont des résultantes visibles, mais la *fonction* est causale, par conséquent un *facteur génétique* et c'est d'ici qu'il faut partir. C'est elle qui implique et relie tous les autres, mais sans avoir une valeur absolue. La nature a son mot à dire même dans le développement d'une fonction de préférence à une autre. La structure de l'habitat change avec plus de lenteur que ne se modifie la fonction du village. Mais tout est étroitement rattaché par le lieu de la fonction qui constitue le facteur actif.

Par conséquent, l'établissement de la typologie des villages — laquelle en essence représente l'établissement des rapports territoriaux-économiques entre l'habitat et le finage — doit avoir en vue la définition même de l'habitat, c'est-à-dire du site du village, considéré comme *cellule organisatrice* de tout le territoire inclus dans les limites du terroir du village. La manière dont on organise l'utilisation du terrain sur le finage entier du village constitue le point de départ et le mode de groupement des exploitations en vue du même but ainsi que l'étendue totale de l'habitat en sont la conséquence. Ainsi, les grandes zones fonctionnelles sont en corrélation, pour une bonne part, avec les principaux types structuraux connus : agricoles-rassemblés, viticoles-dispersés, animaliers-dissipés dans les pâturages de montagne, etc. A ceux-ci, il faut ajouter certains types vestiges où la fonction du passé, aujourd'hui disparue, persiste encore dans la forme du village, comme dans le cas du village linéaire pastoral de vallée (H. H. Stahl, 1958). Il en est de même pour les types déterminés par des conditions de relief spécifiques (tel est le cas du village « polynucléaire » avec des groupes de maisons sur des niveaux de terrasses séparées par des escarpements), etc. Par conséquent, les types de villages

doivent être considérés comme *une résultante* complexe de facteurs qui s'allient : *la nature*, par la position, le relief, les sources d'eau, de sol, les matériaux de construction, etc., avec les *traditions* qui se prolongent comme une traînée de l'histoire sociale avec l'esprit novateur de *l'économie* actuelle, etc. auxquels s'ajoute le facteur des *fonctions* accomplies, lesquelles constituent l'élément dynamique polarisant et qui, par ceci, apporte des changements sur une voie évolutive.

Si autrefois les changements de type des villages se faisaient lentement, au cours de deux dernières décennies ils passent par de véritables métamorphoses, de telle sorte que les types actuels ne sont plus les mêmes que ceux établis entre la première et la deuxième guerre mondiale et, en partie, ils ne correspondent même plus avec ceux établis d'après le critère fonctionnel de 1960. Car, dans les villages il n'y a pas seulement des changements *d'aspect* dus à la construction d'habitations modernes (environ un tiers du fonds total d'habitations), par rapprochement des maisons, ce qui fait que les anciens villages éparpillés sont devenus des villages agglomérés, que les « crînguri » ont disparu en quelques endroits, par conséquent des changements des villages dispersés, puis l'électrification (actuellement 80 % de la totalité des villages sont électrifiés), par l'aménagement de trottoirs, l'alignement des maisons, l'effectuation, dans beaucoup de villages, de travaux éditaires urbains et même par les modifications profondes survenues dans la fonction du village. La socialisation de l'agriculture et la mécanisation de la production agricole ayant pour conséquence le dégagement d'un important pourcentage de la force de travail (de 74,1 % en 1950 la population occupée dans l'agriculture a baissé à 49,1 % en 1970) ont aussi été la cause du déplacement définitif à la ville d'un grand nombre de familles rurales ainsi que de changements fonctionnels essentiels. Parmi ces changements, il faut compter l'apparition d'un grand nombre d'entreprises industrielles dans les villages (dans 1330 communes rurales sur les 2706 existantes, des entreprises ou des sections industrielles fonctionnent actuellement) ; leur nombre est destiné à augmenter considérablement au cours de l'actuel plan quinquennal et, pratiquement, la majorité des villages possèdent des industries pour la transformation des produits agricoles. Un autre changement essentiel est dû à l'utilisation de la force de travail rurale, des hommes surtout, dans l'industrie des villes, les chantiers de construction, les services publics, ce qui exige un trafic intense de va-et-vient. Cette population, entraînée en déplacements pour son activité, ne travaille plus que rarement dans l'agriculture. La fonction agricole, autrefois dominante dans les campagnes, n'occupe actuellement que moins de 50 % de la population rurale. La classification fonctionnelle des villages, effectuée il y a dix ans, ne correspond plus aux réalités actuelles.

Même les fonctions agricoles ont complètement changé dans bien des zones du pays comme suite des modifications subies par le milieu environnant et dues aux travaux d'amélioration. Dans les deux dernières décennies seulement, on a effectué des travaux *d'endiguement* et *d'assèchement* sur une surface d'environ 1,5 millions d'hectares ; les plus importantes comme étendue ont eu lieu dans la vallée du Danube (surtout à la place des anciennes « bălți » (étangs) de Brăila et de Ialomița), dans les zones autrefois marécageuses de la Plaine de l'Ouest (la vallée du Ieriu, la zone

de Cefa, etc.), c'est-à-dire dans des aires dépourvues d'un habitat permanent jusqu'en 1950, et où des sites d'un type nouveau ont apparu, appartenant surtout aux I.A.S. (Entreprises agricoles d'Etat), aux entreprises piscicoles, etc. Au cours de la même période, on a réalisé des travaux d'irrigation sur 697 mille ha de terrain, surtout dans les zones de plaine, ce qui a complètement modifié le mode d'utilisation agricole de ces terres en y introduisant des cultures nouvelles, une technique moderne de l'adduction et du pompage des eaux, de la manœuvre des écluses, etc.; ceci a entraîné de grandes modifications dans les fonctions des villages qui se trouvent sur le parcours des grandes irrigations (Vallée Carasu, Pietroiu-Ștefan cel Mare, Calafat-Băilești, etc.). Il sied d'ajouter à ceci des travaux destinés à combattre l'érosion des sols par l'aménagement des cultures en terrasses lesquelles ont non seulement changé l'aspect de grandes surfaces dans les zones de collines (Pitești, Valea Călugărească, le département de Galați, de Iași), mais aussi remplacé des terrains érodés peu productifs, par des vignes et des vergers, apportant ainsi un changement radical dans l'utilisation des terrains (les plantations de vignobles sur des terres nouvelles effectuées après 1950 représentent 119 000 ha, celles de vergers en massifs, 247 000 ha). De nombreux villages céréaliers ont acquis un profil viticole-pomicole et ce changement de fonction a entraîné d'importantes modifications de l'aspect propre à ces localités. Les exemples sont nombreux et dus aux transformations qui résultent de l'utilisation des terrains sablonneux, désalinisés, etc.

Au cours des deux dernières décennies, un important facteur de modification des localités rurales est dû à l'influence de l'urbanisation, dont le rythme de développement est sans précédent. Ceci se manifeste d'abord par l'attraction vers les villes de la force de travail rurale, créant ainsi l'ample flux pendulaire quotidien des travailleurs qui font la navette (en 1969, à Bucarest seulement, 149 000 salariés venaient chaque jour des villages du département d'Ilfov et ceux d'alentour, et cette catégorie était de 14 000 salariés à Brașov, etc); ceux-ci, par les professions qu'ils exercent, par leur mode de vie, deviennent des facteurs « urbigènes » et répandent le *phénomène sous-urbain* jusque loin autour des villes. Il faut ajouter à cela l'apparition d'industries dans le milieu rural, fait mentionné plus haut, ainsi que l'amplification du réseau de transports modernes qui abrègent le temps de déplacement et ravivent des zones caractérisées autrefois par un hermétisme local, où la production se maintenait presque autarchique et suffisait à couvrir les nécessités familiales. Il en est résulté qu'entre 1950 et 1967 uniquement, de *nouvelles villes* ont apparu, la plupart provenant de villages ayant modifié leurs fonctions et leurs aspects. A l'occasion de la réforme administrative-territoriale de 1968, 49 autres villages ont augmenté le nombre des villes et le processus continue avec rapidité.

Le fait est que le monde des campagnes est l'objet d'un changement radical, sous nos yeux, et, en même temps, le milieu environnant change, lui aussi. Si à ces transformations spontanées on ajoute l'ample action de *systématisation des villages* et du *territoire rural* qui se déroule pleine-

ment dans tous les départements du pays (dont, vu ses proportions gigantesques, nous ne pouvons nous occuper dans cet article), nous comprendrons que les anciennes cartes de types de villages ont perdu leur actualité et que même les anciennes catégories structurales, de grandeur, ou de fonction, ne sont plus les mêmes. La tendance générale semble indiquer pour les deux décennies suivantes : la réduction du nombre de villages, l'accroissement de leurs dimensions et l'aménagement d'éléments édilitaires au niveau des exigences contemporaines, par conséquent la diminution des grands contrastes qui existaient autrefois entre les villes et les villages. Les recherches entreprises dans le cadre des départements et homologuées pour le pays entier révèlent que dans les deux décennies suivantes 335 localités rurales deviendront, comme effet de l'équipement préconisé, des centres urbains destinés à polariser les villages environnants.

Ceci dit, le rôle qui incombe à la géographie, à l'ethnographie, à la sociologie, etc. est de conserver, dans le cadre de ce flux vigoureux des changements, le spécifique local, et ceci non seulement en ce qui concerne l'architecture, mais aussi pour tout ce qui touche au maintien du fonds de tradition populaire, c'est-à-dire au costume, au folklore et à tout ce qui représente les caractéristiques de chaque région de ce pays, car cela peut constituer la contribution apportée par chacune d'elles à l'ensemble de la culture roumaine.

BIBLIOGRAPHIE

- BĂCĂNARU I., BUGĂ D., DEICĂ P., MOLNAR E., ȘTEFĂNESCU I. et TUFESCU V. (1960), *Géographie des villages de la République Populaire Roumaine*, in *Recueil d'études géographiques concernant le territoire de la République Populaire Roumaine*, Ed. Acad., Bucarest.
- BARANOVSKY NICULINA et ȘTEFĂNESCU IOANA (1970), *Repartiția geografică a satelor din România după numărul locuitorilor*, Studii și cercet. geol., geofiz. geogr., Seria geogr., **XVII**, 1.
- GIURCĂNEANU CL. (1971), *Energia habitatului și problemele practice legate de ea*, in *Lucrările Simpozionului de geografie a satului*, 1967.
- MARTONNE EMM. de (1924), *Résultats des excursions géographiques de 1921*, Lucr. Inst. geogr. Univ. Cluj, **I** (1922).
- MIIĂILESCU V. (1926), *Un chestionar privitor la studiul geografic al așezărilor rurale*, Bul. Soc. rom. geogr., **45**, p. 102–104.
- *Trebuie recunoscute trei tipuri de sat: satul adunat (sau concentrat), satul răsfirat și satul risipit*, Idem, p. 106–110.
- (1934), *O hartă a așezărilor rurale din România*, Bul. Soc. rom. geogr., **53**, p. 372–381.
- (1939), *Noțiuni de bază în geografia satului*, in *Lucrările Simpoz. de geografie a satului*, Bucarest, 1967.
- MOLNAR E. (1957), *Așezările de cea mai mare altitudine din Banat*, Bul. Univ. Cluj, Ser. Șt. naț., **I**, 1–2.

- MORARIU T., BOGDAN A., MIHAI M. (1968), *High-zone settlements in the Romanian Carpathians*, Rev. roum. géol., géophys., géogr., Série de géogr., **12**, 1—2.
- STAHL H. H. (1958), *Contribuții la studiul satelor devălmașe românești*, I, Ed. Acad., Bucarest.
- TUFESCU V. (1957), *Mărimea mijlocie a satelor din R.P.R. în anul 1948*, Natura, 4.
- VUJA R. (1938). *Le village roumain de la Transylvanie et du Banat*, in *La Transylvanie*.

Reçu le 30 décembre 1971

*Chaire de géographie économique générale
Faculté de géologie et de géographie
Université de Bucarest*

THE URBANIZATION PROCESS OF THE RURAL SETTLEMENTS IN ROMANIA

by ION VELCEA

Industrializarea socialistă a accentuat și fenomenul de urbanizare a așezărilor rurale, prin marea amploare a construcțiilor industriale în mediul rural, prin construirea complexelor moderne de tip industrial pentru creșterea și îngrășarea animalelor, mecanizarea și chimizarea agriculturii, extinderea sistemului de irigații, modernizarea căilor de comunicație. Trecerea în categoria orașelor a unor localități rurale, cu precădere din partea sudică și estică a țării, ce au astăzi anumite activități industriale, de servicii sau alte funcțiuni, precum și dezvoltarea vechilor centre economice, care și-au intensificat în ultimii ani, relațiile cu localitățile rurale limitrofe etc., au asigurat, de asemenea, condițiile pentru dinamizarea procesului de urbanizare.

Urbanizarea așezărilor rurale reprezintă un proces „în mers” de la rural la urban, localitatea respectivă transformându-se treptat din caracterul său tradițional-rural în cel cvasiurban și apoi urban, datorită activităților industriale, a înzestrărilor edilitare, a participării intense a populației active în sectoarele economice. Procesul de rururbanizare s-a accentuat după 1968, când s-a trecut la organizarea teritorială a țării în unități administrativ-teritoriale complexe sub raport economic și social-cultural și când s-a adoptat programul de sistematizare a localităților rurale. Electrificarea a peste 80 % din numărul total al satelor, extinderea rețelei de alimentare cu apă, cu gaze naturale, construcțiile social-culturale, comerciale, industriale, „înnoirea” centrului civic etc. au contribuit la schimbarea fizionomiei unui mare număr de așezări rurale, la ridicarea economică și social-culturală a acestora. În următorii ani, fenomenul de urbanizare se va intensifica, cele circa 300 centre polarizatoare, care dispun de un important potențial economic și uman, reprezentând viitoarele nuclee urbane ale României.

The socialist industrialization emphasized also the urbanization phenomenon of rural settlements in Romania, through the great amplitude of industrial constructions in rural environment, through the bringing into being of new economic bases of the village, etc. This process was so rapid, during the last years, that not even the surveys of social geography succeeded to include it in its totality. It represents a process “in development” from rural to urban, the respective settlement gradually turning from its traditional rural character to a quasi-urban and then urban

one, due to industrial activities, urbanistic endowments, intense part taking of the active population in the economic processes.

The urbanization process of the villages is obvious through the *erection of industrial units within rural places, of modern complexes of industrial type for animal breeding and fattening, mechanization and chemization of agriculture, extension of the irrigation system, modernization of the ways of communication*, and then by *confering to some rural places the title of town*, especially in the southern and eastern part of Romania, which have at present certain industrial activities, of services or other functions, as well as by the *development of old economic centres* which, during the last years, intensified their relations with limitrophe rural localities.

STEPS IN THE DEVELOPMENT OF THE URBANIZATION PROCESS OF RURAL SETTLEMENTS

Romania disposes of significant and varied power, mineral and vegetable resources, some of which of world renown, as well as of a powerful human potential. In the prewar period, however, the economy was poorly developed and had a marked agricultural character. The major part of the population lived in the rural environment, there being more than 15,000 villages grouped in about 6,400 communes on the territory of Romania.

In the year 1930, the rural population represented 78.6% on the total number of inhabitants, a gravity that remains almost unchanged till about the second World War. The largest settlements, with a gathered and dense structure, were concentrated in the plain regions, where the tillable land represented over 90% of the agricultural area, and the number of inhabitants exceeded 3,000 for a rural settlement. The smallest ones were concentrated in hill regions — at altitudes beyond 400 m — and in montane regions. The latter had a small number of inhabitants, frequently between 100 — 600, and the structure was of a scattered and dispersed nature, the montane and submontane households being isolated and localized amidst farm cultures (especially natural pastures and hayfields).

The prevalence of rural settlements is reflected also by the fact that, in 1938, "of the number of buildings only 12.5% were in towns¹. On the census of 1948, about 12.2 millions inhabitants were counted in the rural environment, which represented 76.6% of the whole population. Hence a close percentage to that recorded in the prewar period. There should be mentioned the fact, that in the extra-Carpathian regions, up to an altitude of about 400 m, there was a still higher percentage of rural population, farming being almost the only occupation of the population. But in the central and south-western part of Romania, under the influence of some old urban agglomerations (Braşov, Sibiu, Medias, Sighişoara, Reşiţa, etc.), the presence of a specialized working power, of an industrial activity, which became more active in the second half of the XIXth century and of a railway net with higher densities (50 km/1000 sq.km) versus the extra-Carpathian regions (30 km/1000 sq.km), the rural settlements displayed a stronger quasi-urban character.

¹ I. Simionescu, *Ţara noastră*, Bucharest, 1938, p. 296.

In the stage after 1950, i.e. after re-establishing the national economy in consequence of the second World War, a series of changes take place in the structure of the national economy, as a result of the intensification of the socialist industrialization process, which influenced also the feature of the rural settlements, the professional structure of the population.

By erecting numerous industrial enterprises, the old industrial places turned into powerful economic centres, while the new industrial areas, with preference brought into being in regions of a marked agricultural character, contributed to the gradual liquidation of regional disproportions.

In the stage after 1968, when the organization of Romania's territory in districts (39) and municipalities (47), as complex administrative-territorial units, was undertaken from an economic and social-cultural angle, as well as the planning of rural places, the urbanization process of villages was intensified.

In the year 1970 the rural population represented 59.2% of the total number of inhabitants. Territorially, however, there are recorded some differentiations, namely: in a number of 12 districts, i.e. 1/3 of their total, the rural population represents between 33% and 56%, that means below the country average²; in other 12 districts the rural population holds between 60—70%³, while in the other 15 districts the gravity is of over 70%.

EMPHASIS LAID ON THE LEADING POSITION OF INDUSTRY

The development of industry in an unfailing rhythm produced essential changes in the geographic structure and distribution of the national economy branches, in the dynamization and intensification of the urbanization and planning process of the rural settlements. The discovery and revaluation of new useful mineral substances, erection of industrial units and sections also in regions with a prevailing rural economy, development of the old economic centres and consequently, the intensification of their relations with the rural environment, etc., induced profound mutations into the village life.

For the economico-social development of the country, a comprehensive programme of investments was carried out. Alone in the period 1950—1965, the sum of 338 billions lei has been invested, of which 57.4% in industry and constructions, 17% in agriculture, 9.8% in transports and telecommunications. The value of investments from centralized funds of the state amounted in the period 1966—1970 to almost 290 billions lei, of which 55.5% for industry, 12.7% for agriculture, 11.5% for transports and telecommunications, etc. Remarkable is the fact that the great majority of investments were assigned to the erection of new industrial capacities and targets, to the extension and modernization of the national

² Hunedoara 32.8%, Braşov 37.2%, Prahova 49.3%, Cluj 48.3%, Sibiu 44%. Constanţa 42.9%, Galaţi 52.5%, Brăila 54.5%, Arad 54.8%, Caraş-Severin 55.9%, Maramureş 55%, Timiş 55.1%.

³ Bacău 62.8%, Covasna 60.8%, Jassy 63.5%, Dolj 64.5%, Alba 61.1%, etc.

economy branches. Thus, but in the years of the last five-year plan (1966—1970), 1,500 industrial capacities and targets were put on stream in the fields of electric power, mining, metallurgy and mechanical engineering, etc. In the present five-year plan (1971—1975), also, the investments from centralized funds of the state, will amount to 470 billions lei, of which about 60% to continue the country's industrialization.

The average yearly rate recorded by the industrial production, was in the last two decades, of almost 13%, Romania being, from this viewpoint, situated among the countries, whose economy is the most dynamic in the world. Great successes also recorded the other branches of the nationale economy, agriculture, forestry, transports, etc., on the modernization, development and improvement line of the technico-material base.

Large investments were distributed especially for developing the regions, — which, in the past, were in a backward state, from an economic angle — in view of a manysided economic development of all the regions of the country. In this way, many industrial targets appeared, in centres lacking industry or poorly industrialized of Moldavia, Dobrudja Oltenia, etc. The latter are at present in full industrial development, even exceeding, as to the industrial bulk production, the average increase rate of the country's industrial production. Thus, in some districts in southern Romania (Dolj, Olt, Ialomița, Buzău, Gorj), the yearly average increase-rate of the industrial production ranged between 17% and 22%.

In the present stage, industry represents the leading branch of the national economy, taking part by about 64% in the total social product of the country and by over 57% in the national income. Industry, today present in all districts of the country, recorded remarkable increases, being by 18 times as large in 1971 as the production level reached in 1938. This fact brought forth favourable social and economic premises for the urbanization of rural settlements in Romania.

Potential and structure of manpower. Romania disposes of a significant human potential able to work, the number of workers and employees being of almost 9 millions⁴ in 1970, versus only 3.3 millions in 1950. The great majority of the active population is working in the field of material production, i.e. 88.1% of the total population busy in branches of the national economy. Our country's human potential results also from the fact that almost 61% of the total number of inhabitants (20 millions in 1969) is represented by the population in the active age ranging between 15 and 60 years.

The rapid economico-social development of our country required the integration in the material production field of a large number of people, especially from the rural environment. The increase of the industrial production volume, the bringing into being of new industrial branches and sub-branches explains the directing of the manpower, mainly, towards industrial and building activities. Thus, the gravity of those working in industry raised from 12% in 1950, to 23% in 1970, while that of those in constructions from 2.2% to 7.8%. In the same period, significant increases were recorded also in transports of goods from 1.3% to 2.9%,

⁴ This total does not include employees of the public organizations, pupils, students and other categories of employees. See *Anuarul Statistic al RSR*, Bucharest, 1971, pp. 123—146.

as well as in the circulation of goods from 2.5% to 4.3%. Simultaneously, however, decreased the number of population busy in agriculture, from 74.1% in 1950 to 49.1% in 1970.

Introduction, on a wide scale, of the scientific and technic progress into the national economy, and first of all into industry, the growth of the mechanization and automation degree produced a certain mobility of the manpower. Thus, the gravity of the population busy in the field of material production decreased in the course of two decades by 4.5%, as a result of the increase of gravity of the population busy in the non-productive field, especially in the fields of : municipal economy, education, science, culture, health defence, etc. In 1970, the population busy in the nonproductive field⁵ held 11.9% of the total busy population, versus 7.4%, represented in 1950.

The dynamic character of the national economy determined also the numerical increase of workers from 1,223 thousands in 1950 to 3,839 thousands in 1970, hence an increase by over three times. Of these, in industry alone, worked over 1.8 million workers in 1970, versus 640 thousands in 1950. A great number of workers is in the branches : constructions (15.5% in 1970), agriculture (9.8%), circulation of goods (8.9%), transports (7.8%), etc.

Development and modernization of all national economy branches permitted also the growth of the number of employees, with preference of those working in industry and constructions, in transports. Of the total of 5.1 millions employees (1970), over 40% are on the staff in industry, 13.4% in constructions, 8.6% in agriculture, 6.7% in transports, 8.4% in the circulation of goods, etc. Simultaneously, however, to provide a relation corresponding to the present requirements, between those who work directly in the production and those in administrative services, the number of administrative employees fell from 137.6 thousands in 1950 to 65.6 thousands in 1970. The municipality of Bucharest concentrates the highest number of employees, i.e. 16%, and together with the districts of Prahova, Braşov, Timiş and Cluj almost a third of the total number of the country's employees existing in 1970.

DYNAMIZATION AND INTENSIFICATION OF THE URBANIZATION PROCESS

The rush of the active population from the rural environment towards the urban one, the turning of some rural places into the town category, as well as the natural increase, explain the rapid growth of the number of inhabitants in the urban environment. Thus, from 142 towns, which existed in 1930, today the number of towns reached 236, of which 47 have the rank of municipality.

Hence, in the period 1948—1956, a number of 33 places passed into the town category, generally mining centres (Vulcan, Lupeni, Petrila, etc.), balneal and climatic resorts (Buziaş, Olăneşti, Băile Herculane, Sovata, Borsec, etc.), various rural places former administrative residences and

⁵ Passenger transports, telecommunications, municipal economy, education, culture and art, science and scientific service, health defence, administration, etc.

others. Now also appeared the new towns of Victoria and Gheorghe Gheorghiu-Dej, important centres of the chemical industry and the town of Dr. Petru Groza a centre specialized in the industry of wood processing and mechanical engineering.

Between the years 1956—1970 other 61 localities were declared towns, to the major part rural centres with industrial activities or localized services, with preference, in the extra-Carpathian regions. Among these, we mention in Oltenia the towns of: Motru (coal industry), Tg. Cărbunești (industry of building materials), Novaci (wood processing), Țicleni (mineral oil), etc. Noteworthy is the fact that, within the towns, which appeared during the years of socialist construction, industry tends to assert itself, from the beginning as basic economic branch. Actual "satellite-towns" have been erected during the last two decades in the outskirts of Bucharest (Drumul Taberei, Balta Albă, Bucureștii Noi, etc.), Constanța (Tomis Nord), Iași (Tătărași, Copou), Galați (Țiglina), Pitești (Calea București, Trivale, Drumul Craiovei), Baia Mare (Săsar), Tg. Mureș (Dîmbul Pietros), Brașov (Steagul Roșu), Reșița, Craiova, Timișoara, Oradea, Slatina, etc. Alone in Bucharest, the quarters of Titan — Balta Albă concentrate about 200,000 inhabitants. Plans of large proportions were carried out along the Black Sea shore, between Mangalia and Capul Midia, where urban nuclei appeared with balneal-climatic functions.

The urban "expansion" is going to continue also in the period 1971—1975, when there are going to be built, especially from centralized state funds, further 522,000 flats. The amplitude of these buildings will be so great, that to the end of the year 1975, as against 1966, the number of persons moved into new dwellings will attain 5 millions.

Through the extension of old urban centres and the appearance of new towns, new possibilities have been created for a higher revaluation of the economic and human potential in all the provinces of Romania.

NEW ECONOMIC BASES OF THE VILLAGE

Orientation of agriculture towards an intensive and efficient production. The agriculture of Romania, today in full process of modernization, disposes of exceedingly favourable natural and social-economic development premises. Co-operativization (1962) and performance of territorial organization operations facilitated some important changes in the structure of agricultural lands and especially the cultivated lands. Equipping of agriculture with machines and tools (107.5 thousands tractors; 50.2 thousand cereal-combines, about 60,000 mechanical sowers in 1970, etc.) diversification of mechanization also in zootechnic, vine-and fruit-growing and vegetable sectors, application of a quantity of 2.7 millions tons of chemical fertilizers — an active substance (in the period 1966—1970), as well as the extension of hydroameliorative operations in the Danube waterside⁶, in the Jiu, Olt, Argeș, Siret basins, etc., and soil erosion control through terracing works in weathered regions, facilitated the raise of the productive potential of the land.

⁶ Along the Danube Valley alone, 1,060 km of embankments were carried out, as well as 55,000 ha of soft essence clearings, 50,000 ha reed cutting, etc., rendering over 400,000 ha to the agricultural circuit.

The modernization activity of the agriculture is intensified through the extension of irrigations, especially in the Romanian Plain (the large systems of the Bărăgan, over 120,000 ha; the Calafat—Băilești system 50,000 ha; the lower Olt zone 42,000 ha; and others in construction: Olt—Călmățui, about 47,000 ha; Mostiștea; Sădova—Corabia, etc.), in the Dobroudja (the Carasu system—180,000 ha; the Dunavăț system), and in other regions of the country. The total surface planned for irrigation increased from 42.5 thousands ha in 1950 to 750,000 ha in 1970, going to reach 2.1 millions ha in 1975.

Remarkable changes occurred also in the structure of cultivated lands, brought about by the population's consumption necessities, by providing the industrial enterprises with agricultural raw material.

Especially increased the surfaces cultivated with industrial plants (from 2.6% they represented in 1938, to 10.9% in 1970, of the total cultivated area), and fodder plants (from 6.7% in 1938, to 15.5% in 1970). Among the industrial plants a significant extension was given the sunflower and sugar-beet cultures. For the development of vegetable growing, high efficiency greenhouses were built in Bucharest, Ploiești, Arad, etc., involving a total surface of almost 850 ha. Remarkable areas were reserved also to flax cultures for oil, soya bean, castor-oil plant, poppy, medicinal herbs and herbs, etc. The land cultivated with cereals, even though it has been reduced in surface, continues to hold the highest weight of the total cultivated surfaces, i.e. 64.3% (1970), the pedoclimatic and relief conditions being very favourable. As a result of the changes, occurred in the geographical structure and distribution of the land-use categories, the tillable ground of the country's total surface, arrived to represent 41%, the natural pastures and hayfields 18.6%, vineyards 1.5%, orchards 1.8%, and forests 26.6%.

Under the modernization conditions of agriculture — the complex mechanization of the present five-year plan —, about 400,000 individuals are going to be oriented from farming to industry and other activities, which will induce new changes in the structure on branches of the active population. In this way, in 1975, the population active in agriculture will represent about 40% of the total active population, while in 1980, as a result of the accelerated industrialization of the country, about 80% of the active population is going to work in non-agricultural branches of the economy.

Development of the large production in agriculture, an important factor in the urbanization process of rural settlements. A considerable part of the investment funds have been assigned both to the growth of the land-fund's production potential, and to the building of industrial units in the rural environment with the purpose of improving the distribution of productive forces on the country's territory.

Of the 2706 communes, almost the half had industrial enterprises or sections, at the end of the year 1968, rendering valuable local resources⁷. These are, especially, in the field of vegetable and fruit industrialization and semi-industrialization, milk processing, building materials (brick-yards, gravel pits, concrete prefabs, etc.), wood processing, etc.

Substantially has increased the electric power production and consumption, the main indexes of the civilization level. Thus, the electric power production/inhabitant has increased from 130 kwh in 1950 to

⁷ * * Județele României Socialiste, Ed. Politică, Bucharest, 1969, p. 22.

1700 kwh in 1970, and is growing continually, if we take into account the new electric power units in construction.

During the last years in the village environment also modern zootechnic complexes have been built, based on industrial breeding and fattening methods of pigs, bovines and poultry. Industrial complexes of pig breeding with a capacity of about 130,000—150,000 heads and of breeding and fattening of bovines were erected with preference in the farming zones of the Romanian Plain, the Dobrudja Tableland and the Western Plain. Numerous are also the poultry raising complexes, spread all over the country. In order to still better correlate animal breeding with a fodder base, some factories of combined fodder, with a capacity of about 100,000 t/animal were built.

Other mutations in the village life. Organization of the rural places, on modern bases, by the electrification of 80% of the total number of villages (1970), by extending the sewerage system, water and natural gas supply, by the building of civic centres, etc. led to the change of the feature of a great number of rural settlements.

The social-cultural, commercial buildings and of some industrial sections, the "renovation" of the civic centre, towards which the entire social-economic life of the place is gravitating, etc., contributed to the activity of economic and social-cultural raising of the rural settlements⁸.

Within the general planning scheme of the rural settlements, already in the period 1968—1971 planning sketches were drawn up for more than a half of the total number of communes and, till 1975, all the rural settlements will be provided with planning sketches. The districts of Ilfov, Ialomița, Galați and others have already finalized the planning sketches of the commune residences. Difficult problems, however, are raised by the planning of human settlements in hill regions, scattered on slopes, in remote regions⁹, disposing of a reduced economic base and which require to be relocalized or integrated into the precincts of viable villages with wide economic-social development possibilities and technic-municipal endowment.

In about 90% of the total number of communes exists at the end of the year 1970 service units for the population and health centres. In the whole country in the period 1966—1970 alone, over 660,000 flats were built, of which almost 40% in the rural environment.

By bringing into being new economic bases in the village, the social and professional structure of the villages has also changed. Mechanized, zootechnicians, farming engineers and of various specialties, etc., are present in all the communes of the country. The number of university

⁸ Today there are numerous rural places with a quasi-urban and even urban feature namely: Colibași, Lerești (Argeș distr.), Scornicești, Potcoava, Piatra Olt (Olt distr.), Râșvad (Dâmbovița distr.) Mineciu-Ungureni (Prahova), Băbeni-Bistrița (Vilcea). M. Kogilniceanu (Constanța), Ivesti Liești, Cosmești (Galați distr.), Valea lui Mihai, Suplacu de Barcău (Bihor), Recaș Lovrin (Timiș), Vidra, Guguști (Vrancea), Lehliu, Dragalina (Ialomița), etc.

⁹ For the reevaluation of the hydropower potential of the Bistrița Valley and the Danube Valley the dislocation of some rural settlements situated up-stream of the locality of Bicaz and of Orșova, respectively, and their placement according to a modern planning scheme and architectonical building, were required. The hydrotechnic arrangements on the Someș Valley, also raise the problem of placing the households situated in the area of the future accumulation lakes of Gilău and Tarnița.

graduated specialists in agriculture has increased from 7,900 in 1961 to 16,100 in 1968, and that of those with secondary school studies from 9,544 to 17,325. We also dispose of over 105,000 mechanizer-tractorists.

Then, there is a powerful commercial net in the rural environment (28.3 thousand units in 1970), shaped in a proportion of 3/4 on the sale of food and nonfood goods¹⁰, as well as a wide spreading net of culture.

The building of industrial units and sections, of zootechnic complexes of an industrial type in the rural environment, etc., induced not only changes in the landscape of the Romanian village, but also in the working conception of the population. These organization forms, which require a qualified labour, lend the farmers new knowledge, and in this way bring them still closer to the mentality of the industrial worker, the conception of industrial work.



During the next years, according to the progress recorded by the national economy, the urbanization phenomenon of villages will be still more intensified. The 300 regional polarizing centres, disposing of an important economic and human potential, represent the future urban nuclei of Socialist Romania, a country, which today disposes of an industry and agriculture in full development and modernization, of a unitary socialist economy.

Received December 20, 1971

*Chair of Geography
Faculty of History
University of Bucharest*

¹⁰ Communication regarding the achievement of the economic-social development plan of the Socialist Republic Romania, in the period 1966–1970. Ed. Politică, Bucharest, 1971.

ECONOMICAL AND DEMOGEOGRAPHICAL PREMISES IN THE URBANIZATION OF THE SOCIALIST REPUBLIC OF ROMANIA

by VASILE CUCU

Industrializarea socialistă și transformarea cooperatistă a agriculturii se află la baza tuturor manifestărilor urbanizării R.S. România. Pe acest fond, și în strinsă corelare cu înfățișarea fizică geografică a teritoriului țării, se afirmă o serie de factori specifici ca structura, armătura și dinamismul sensibil din cadrul rețelei de așezări, care, pe lângă accentuarea dezvoltării orașelor, determină mutații puternice în urbanizarea satului, a teritoriului în ansamblu.

Sistematizarea localităților determină profunde modificări urbanistice; orientarea cererii de consum, „denaturalizarea” accentuată a consumului, valoarea producției, ilustrează legătura strinsă dintre urbanizare și producția materială; progresul tehnic, științific și cultural, manifestarea lui în toate mediile relevă tendința crescândă de independență relativă a urbanizării față de industrializare. Procesul actual al urbanizării în România a depășit faza dezvoltării rapide a orașelor pe baza industrializării, apariției de noi orașe numai prin industrie sau prin creșterea numerică a populației orașelor.

Se remarcă apariția unor legi specifice datorită cărora urbanizarea devine condiția esențială care orientează profilul și amplasarea producției materiale.

Urbanization in Romania represents a complex and objective social-economical process determined by the intensity of some activities which take place in different localities or regions of the country.

The present urbanization co-ordinates are designed to both demographic quantitative indices and merely those qualitative of the technico-economical supply in counties, towns or villages.

As a background premise, all economical, cultural, psychological and social processes (the primary aspects of urbanization) are based on the socialist industrialisation and co-operativization of agriculture.

At present, Romania undergoes a development which allows the industry to penetrate both in towns and villages. Consequently, a continuously improving process is taking place from the viewpoint of life standard and cultural level.

The agriculture turns itself into an industrial branch, determining some changes in the relationship town-village and between urban life and

rural life. It is significant to note an important figure: 100 billions lei which will be designed for agriculture during the present Five-Year Plan. This means essential modifications of material sources and zootechnical production, the building of much more industrial objectives, fodder mills, stockfarms and fattenfarms, green-houses, ameliorations; it also means the intensification of industrial activities of rural co-operators and of the consumers' co-operative system. Moreover, the intensifying of these activities determines the more complete utilization of the manpower in rural environment, the attachment of agriculture to the entire economy.

It is significant that in 1971 the production obtained from these activities in the rural environment (the industrialization of agrozootechnical products, building materials, timberwork, etc.) represents about 2.5 billions lei.

Thus the technical progress became the primary factor of the urban concept.

There is an economical solid background as results of the development of the socialist unitary economy, which permits large perspectives for impulsing the urbanization of all Romanian territory.

Consequently, this evolution leads to a new *structure*, a sensitive dynamics of the *settlement system*.

While in 1966, 15,019 villages had built up 4,259 communes, today the 13,149 villages are grouped only in 2,706 communes (from which 145 are urban). Thus, it results a demographic average of 4,580 inhabitants for one commune (in 1966—3,027) and an average of 955 inhabitants in a village (827 inhabitants in 1966). We can estimate the up-to-date average for the Romanian communes and villages (comparatively with these abroad) as being between the best limits established by the requirements of the development and the urbanization of all the territory.

Thus, the armature of the settlement system represents another principal premise of the urbanizing process. The Romanian practice of establishing new towns (53 towns from 1966) explains the necessity of knowing and realizing the processes which stay at the basis of territorial distribution of inhabitants, at the basis of development and increasing of settlements. Only defining the actual rules of the development and the appearance of the new types of settlements, we can forecast with certitude the future urban settlement system.

The brief analysis of the rural settlement system in Romania is relevant for the favourable conditions considerably increasing the present urban system. One must bear in mind the fact that 296 communes have each more than 7,000 inhabitants¹, which represent about 20% from all the people of the country. Moreover, it exists a good repartition of the territory. A county has generally 69 communes (in 1966 — 109 communes) (Table 1). The dispersion indices of the villages within the communes is positive, merely in the plain, where the number of towns is low².

¹ The number of communes with more than 5,000 inhabitants is 899.

² 1—2—2.5 in the plain opposing to 5—10 in the plateau and mountain regions, accordingly to Demangeon's formula.

Table 1

The prevalence of urban population and the classes of towns by counties
(July 1, 1971)

County	Prevalence of urban population (%)	Number of towns				Number of communes		
		Total	< 20,000 inhab.	20,000 inhab. — 100,000	> 100,000 inhab.	Total	Sub- urban	> 7,000 inhab.
Alba	40	9	5	4	—	67	1	3
Arad	45.5	8	7	—	1	67	4	7
Argeş	31.6	5	3	2	—	94	6	8
Bacău	37.8	7	4	3	—	80	6	14
Bihor	35.1	8	7	—	1	87	3	8
Bistriţa-Năsăud	17.4	4	3	1	—	53	—	2
Botoşani	19.9	4	3	1	—	69	3	15
Braşov	63.1	9	6	2	1	43	1	2
Brăila	45.9	2	1	—	1	41	2	3
Buzău	19.2	2	—	2	—	83	14	—
Caras-Severin	44.8	8	6	2	—	69	1	4
Cluj	51.9	6	3	2	1	74	5	7
Constanţa	57.5	8	6	1	1	49	4	6
Covasna	40	5	4	1	—	33	3	—
Dimboviţa	31.6	6	3	3	1	69	11	11
Dolj	35.8	5	4	—	1	95	5	15
Galaţi	45.8	4	2	1	—	56	5	10
Gorj	27.8	5	4	1	—	64	3	3
Harghita	34.2	9	7	2	—	49	3	—
Hunedoara	66.7	12	5	7	—	57	6	1
Ialomiţa	25.3	4	2	2	—	55	1	10
Iaşi	36.7	4	2	1	1	85	5	9
Ifov	11.4	4	2	2	—	125	4	27
Maramureş	45.4	7	4	3	—	62	5	6
Mehedinţi	32	5	4	1	—	59	2	1
Mureş	39.5	6	2	3	1	91	5	7
Neamţ	30	4	2	2	—	70	4	11
Olt	20	5	2	3	—	96	3	2
Prahova	50.9	14	12	1	1	86	16	16
Satu Mare	28.5	4	2	2	—	56	1	6
Sălaj	17.7	4	4	—	—	54	—	1
Sibiu	67.4	7	5	1	1	55	5	3
Suceava	23.4	8	6	2	—	90	4	13
Teleorman	24.6	5	2	2	—	84	6	13
Timiş	45	6	4	1	1	76	3	12
Tulcea	28.1	5	4	1	—	43	—	4
Vaslui	22.3	4	1	3	—	71	—	8
Vilcea	23	8	7	1	—	78	1	2
Vrancea	22.4	5	4	1	—	59	2	11
Bucharest municipy	96.1	1	—	—	1	12	12	—
Total Romania	42.2	236	156	66	14	2706	145	290

A phenomenon, less treated by the geographers but very useful for realizing the urbanization process, is the *orientation of the consumption*. Obviously, there is the so-called "consumption denaturalization" which takes place, i.e. the prevalence of the necessary products obtained from the market opposing to those produced in the individuals farms. The rural trade system is intensively developing and diversifying. At the end of 1970, it has comprised 28,300 units, i.e. 3,000 units more than in 1965. From these latter 74% represents foodstuff sales and 24% public nourishment³. In 1970, for instance, the rural people had bought 2.7 times more gas stoves, 2.4 times more coolers, 2.3 times more T.V.-sets, 1.9 times more furnitures, clothes and knitwear than in 1965. Undoubtedly, this is a result of the increasing pecuniary prevalence in the income of rural people, and also of the rate of the extension of comfort and civilization in the country, a very important premise for estimating the urbanization process. The fast commercialization of the agricultural products allows the people settlement and reduces the migration magnitude. To establish all the characteristic features of the village urbanization, we must note also the rural electrification (the electrificated villages represents 4/5 from the total number), the mechanized agriculture and the technical-urbanistic supplying of the villages (especially drinking water supply).

The planning of the settlements, action that began in 1968, initiates deep urbanistic changes, by creating in each rural settlement a civic centre well defined and equiped with all social-cultural institutions necessary for the village bringing-up-to-date.

Obviously, the primary role in the village and territory urbanization is played by the towns.

The urbanization stages can be observed in the social-economical place and territorial supremacy of many Romanian towns, their administrative limits (especially in the case of big towns).

A constant factor for evaluating the town urbanizing effect is the continuous increasing number of urban inhabitants and the number of towns. The demographic situation represents the basis which conditions the urbanization.

Urban people of Romania summarised in 1970 8,258,100 inhabitants (the total number of inhabitants was 20,252,500), which represents 40.8% (this is a significant increase because in 1965 the number of existent urban people was 6,417,600 inhabitants, 33.7% respectively). On the 1st of July 1971 the urban population prevalence was 42.2% (Table 1).

From this point of view, the reasonable distribution ratios of urban population by counties are illustrative. The minimum prevalence of urban people in counties is 17.4% (e.g. County Bistrița-Năsăud)⁴ and the maxi-

³ Overall, the state and co-operatist sales system had comprised, in 1970, 61,600 commercial units, from which, 47,500 foodstuff sales units and another sales units and 14,100 units for public nourishment.

⁴ Except the county of Ilfov, which comprises 11.4% urban inhabitants, excluding the Bucharest municipality.

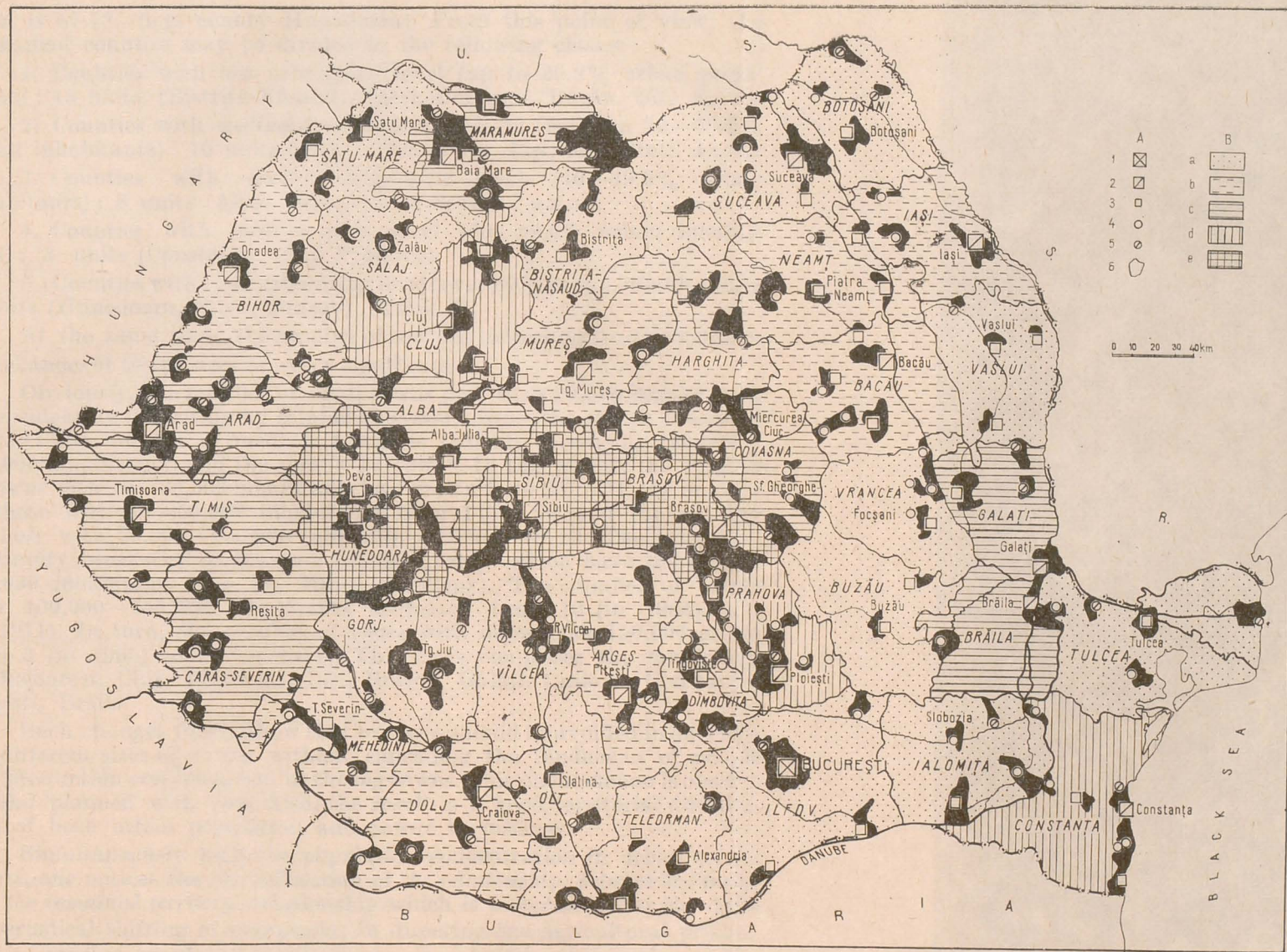


Fig. 1. — A. Towns of Romania according to their degree and influential zones: 1, town, coordinative of all urban functions; 2, towns as “crucial centres” or “growing poles”; 3, town as equilibrium centres; 4, towns as centres of zonal attraction; 5, towns as centres of local influence, “complementary”; 6, urban areas. B. Urbanization level of departments: a, low level (under 29.9% urban population); b, middle low level (between 30 and 39.9% urban population); c, middle level (between 40 and 49.9% urban population); d, high middle level (between 50 and 59.9% urban population); e, high level (over 60% urban population).

mum is 67.7% (e.g. county Hunedoara). From this point of view, the Romanian counties may be divided in the following classes :

1. Counties with *low* urbanizing level (up to 29.9% urban population) : 15 units (Bistrița-Năsăud, Sălaj, Botoșani, Buzău, Olt, a.s.o.).
2. Counties with *medium-low* urbanizing level (between 30—39.9% urban inhabitants) : 10 units (Argeș, Dîmbovița, Iași, Mehedinți, a.s.o.).
3. Counties with *medium-urbanizing* level (40—49.9% urban inhabitants) : 8 units (Alba, Timiș, Caraș-Severin, a.s.o.).
4. Counties with *medium-rised* level (50—59.9% urban inhabitants) : 3 units (Constanța, Cluj, Prahova).
5. Counties with *rised* urbanizing level (over 60% urban inhabitants) : 3 units (Hunedoara, Sibiu, Brașov) (Table 1).

At the same time, the number of towns is increasing from 183 to 236. The changes of towns sizes are very significant.

Obviously, the number of small towns (less than 20,000 inhabitants) is considerably increasing by establishing new towns (the sum is 156 small towns). The number of medium towns is sensibly increasing (20,000—100,000 inhabitants) and the sum is 16 towns. In this period, the number of towns with 20—30,000 inhabitants had grown from 23 to 31, the number of those with 30—50,000 inhabitants from 14 to 20 and the number of those with 50,000—100,000 inhabitants from 7 to 12. The transition continuity breaks up in the case of these towns which have more than 100,000 inhabitants (the Tg. Mureș municipality). The number of towns with 100,000—150,000 inhabitants decreased from 10 (in 1965) to 4 (in 1971). In turn, the number of those with more than 150,000 grows from 3 (in 1965) to 10 (in 1971). This class comprises the municipalities of Bucharest, Cluj, Timișoara, Iași, Brașov, Galați, Craiova, Constanța, Ploiești, Brăila.

Such changes firstly show that excesses should be avoided in developing different sizes of towns without cancelling the tendencies of people and production concentration in the big towns. This phenomenon is observed and planned with care. Also, the result is a good territorial distribution of both urban population and towns themselves.

Simultaneously with the population concentration in urban settlements, one notices the intensification of the *relationship between the towns and the remained territory*, relationship which is materialized in the daily or periodical shifting of manpower, in directing the agricultural production to market supplying in the towns, in a better organization of the means of conveyance and communication.

As a result of the improvement and extension of the means of transport and communications, the “dimensions” of industrial and commercial centres had considerably increased. By adding the extension of electrical network, natural and oil gas distributing system, we can realize how many regions of the country are depending on the urban centres. These multiple relations between urban and rural centres are materialized territorially in the evident changes of the landscape, in the better standard of living of rural people.

The map of Romanian urbanization shows the characteristics which define a town hierarchy on the basis of their territorial influence upon the settlement system on the whole. An obvious territorial sequence is observed in the case of big towns — “crucial centres” (or “growth poles”) — “balance centres”, “centres with zone influence” or “complementary centres”.

We can thus find a close relationship between the historic-economical factors and the natural ones in the continuous development of urban settlement system.

Very important is the fact that simultaneously with the industrial productive activities and with the social-cultural ones which form part of the tertiary system, the urbanization of Romania takes place.

The relationships between town industrialization and intensifying of the tertiary activity, the multiple social-cultural, commercial, touristic mutations occurring in the village life lead to expressing the objective reality resulting in the growing tendency of relative independence of urbanisation as against industrialisation. *The present urbanisation process in Romania* actually surpassed the stage of rapid town development basing upon industrialisation, the appearance of new towns only through *industry* or through *numerical growth of town population*.

The action of some specific laws is worthy of note owing to which urbanisation becomes the essential condition in orienting the profile and settlement of material production.

It is undoubtedly that, besides the fundamental economical and social elements, the natural surroundings, the physico-geographical landscape of the country are playing an important role in Romanian urbanization. The plains offer fertile fields which represent very important premises for any kind of town.

From ancient times, the hills and Subcarpathian regions, rich in natural resources, were very intensively populated zones either for exploitation or for exchanges of goods.

Gradually, the mountains with their depressions and their cross valleys became excellent zones for the development of various types of towns, on the basis of an active economical circuit and exchanges.

Moreover, there are the seaside and the Danube valley which are very important for Romanian people and had allowed the appearance, the superposition and the sequence of the various urban centre types.

Recording and correlating the above data, *we find that in fact, in Romania, every geographical zone is governed or is directly dependent, by less or more close links, on a certain urban centre.*

The urbanizing process acquires new aspects, being an irreversible social-economic phenomenon.

Today in Romania the discrepancy between : “urban” and “rural” acquires another significance; the urban zones which in the past have

had evident geographical boundaries, in present penetrate into the territory, intensifying non-agricultural activities, rendering valuable the numerous and various resources, the political ideas, the kinds of residence, goods or administrative structures. All this shows a new type of evolution, urbanization playing the primary role.

Received December 27, 1971

*Department of General Economic Geography
Institute of Geography
Academy of the Socialist Republic of Romania
Bucharest*

LES GRANDES VILLES DANS LE SYSTÈME DES ÉTABLISSEMENTS URBAINS DE ROUMANIE

par PETRE DEICĂ

Urbanizarea în R.S. România cunoaște un avânt considerabil. Creșterea populației urbane în perioada 1930 — 1970 a fost de 2,1 ori față de creșterea populației totale a țării care a crescut de 1,4 ori, iar ponderea populației urbane a crescut de la 21,4 % la 40,8 %, în cele 236 orașe actuale dintre care 2/5 au apărut după anul 1948.

Sub influența directă a industrializării, procesul de urbanizare în România se află în etapa creșterii rapide prin urbanizarea regiunilor rămase în urmă, creșterii rapide a populației orașelor mari și extinderii rețelei acestora ca centre generatoare de sisteme regionale urbane și aglomerații urbane.

Forța motrică a urbanizării în etapa actuală — orașele mari — prezintă aspecte specifice de dezvoltare. În studiu se analizează diferitele probleme demografice, de creștere numerică a populației, influența lor asupra mediului înconjurător în comparație cu orașele mari din țările vecine.

L'urbanisation revête, dans l'époque contemporaine, un caractère presque universel, devenant l'un des aspects essentiels du processus historique mondial. Le rythme rapide de l'urbanisation fut de nature à mener à des changements qualitatifs dans l'appréciation même du processus d'urbanisation : c'est que le contenu de la notion d'urbanisation arrive à se modifier ; les relations mutuelles entre l'urbanisation et la société s'étendent et s'intensifient ; l'influence de l'urbanisation sur les diverses sphères d'activité s'accroît, nécessitant, implicitement, l'étude attentive des lois et des mécanismes des processus d'urbanisation.

L'urbanisation dans la République Socialiste de Roumanie a connu un essor considérable pendant les plus de 25 ans d'édification de la société socialiste. Dans la période 1930 — 1970 la population des villes s'est accrue de plus de 2,4 fois, tandis que le rythme de l'accroissement de la population du pays tout entier a été de seulement 1,4 fois. Grâce à cet accroissement rapide, le pourcentage de la population urbaine est arrivé, lui aussi, de 21,4 % en 1930 à 40,8 % en 1970. Sur la carte de la Roumanie figurent 236 villes, dont 2/5 ont apparu après 1948. Le facteur décisif dans le développement du réseau urbain en Roumanie est l'industrialisa-

tion socialiste. L'industrie est devenue le levier du renouvellement et de la dynamisation radicale des anciennes villes, et, d'un autre côté, a déterminé un caractère urbain de plus en plus accentué de maints établissements ruraux, de même que des nouvelles villes créées sur des terrains vagues. C'est elle qui a fait augmenter l'activité organisatrice de la ville, dans l'ensemble du territoire limitrophe à un niveau supérieur, par le transfert de leur centre de gravité de la sphère de la circulation des marchandises dans la sphère de la production matérielle.

Dans ses grandes lignes, le processus d'urbanisation en Roumanie peut être défini par les directions suivantes : a) l'accroissement rapide de la population des grandes villes et l'extension de leur réseau ; b) le développement de la complexité de la structure des villes polyfonctionnelles, centres générateurs de systèmes régionaux de localités urbaines de rangs différents ; c) l'urbanisation des régions arriérées au point de vue industriel ; d) la formation et l'accroissement rapide de la population des nouvelles villes (créées sur des terrains vagues) ; e) l'agglomération des localités urbaines et rurales autour des grandes villes.

La principale force motrice de l'urbanisation dans l'étape actuelle est représentée par les grandes villes — celles dont la population dépasse 100 000 habitants —, qui disposent d'un potentiel socio-informationnel considérable et des indices les plus élevés quant au niveau de culture, d'enseignement et, en dernière instance, de productivité du travail social.

Le développement des grandes villes, leur accroissement numérique, représentent un processus de perfectionnement général de la structure du territoire de l'économie nationale, qui, dans les conditions du développement impétueux des forces productives, nécessite un nombre de plus en plus accru de grands centres.

Dans l'étape de la reconstruction de l'économie nationale et, plus tard, dans la période des premiers plans quinquennaux de développement de l'économie nationale, les grandes villes, par leur potentiel économique et humain, ont constitué des points d'appui dans l'œuvre d'industrialisation socialiste du pays. Le processus de l'industrialisation socialiste a conduit à l'accroissement rapide de la population et à la promotion dans la catégorie des grandes villes des centres urbains, qui jouissaient, d'une position géographique favorable et avaient un potentiel économique assez élevé. Si en 1930 il n'y avait en Roumanie que 4 grandes villes — avec plus de 100 000 habitants (Bucarest, Cluj, Iași et Galați), à présent la catégorie des grandes villes compte 13 villes, auxquelles, dans un futur prochain, vont se ranger aussi d'autres villes à développement économique et édilitaire rapide (Bacău, Tg. Mureș, Pitești)¹.

¹ A ce point de vue, la Roumanie présente le rythme le plus rapide d'accroissement du nombre des grandes villes. Dans le même intervalle de temps, le nombre des grandes villes avait augmenté de 2,2 fois en Pologne, de 2,5 fois en Bulgarie, de 1,6 fois en Yougoslavie et en Hongrie, tandis qu'en Tchécoslovaquie et en République Démocratique Allemande, ce nombre est resté à peu près le même. Aussi du point de vue du degré de concentration de la population urbaine dans les grandes villes, la Roumanie se situe avant les autres pays voisins à l'exception de la Hongrie, où le réseau urbain est dominé par la ville de Budapest, qui renferme plus de 76 % de la population des grandes villes. En Pologne, les grandes villes détenaient 43,3 % de la population urbaine en 1969 ; en République Démocratique Allemande — 29,8 % en 1969 ; en Tchécoslovaquie — 24,5 % en 1969.

Pendant la période 1948—1956, dans cette catégorie se rangeaient les villes à développement industriel plus accentué, telles que Arad, Braşov, Ploieşti, Timişoara et Brăila, et dans la période 1956—1966, Oradea, Constanţa, Craiova et Sibiu.

L'attraction exercée par les grandes villes se reflète aussi par la tendance de concentration de la population. En 1970 ces centres concentraient 46,5 % de la population urbaine de la Roumanie, tandis qu'en 1930, seulement 31 %. Cette croissance fut réalisée surtout par la voie de la migration interne — fait illustré par les données du recensement de 1966, qui montre que 35,4 % des habitants des grandes villes étaient nés dans ces villes (en 1930 il y en avait 46,8 %).

La tendance de concentration de la population urbaine dans les grandes villes est démontrée aussi par d'autres données statistiques : si, durant la période 1930—1970, la population urbaine dans son ensemble a augmenté de 2,4 fois, la population concentrée dans les grandes villes était, en 1970, 3,7 fois plus nombreuse que celle des 4 grandes villes qui existaient en 1930. De la croissance totale de la population urbaine dans la période 1930—1970, environ 1/2 revient, également, aux grandes villes ².

Au développement rapide des grandes villes contribue tout un ensemble de facteurs. Il s'agit, tout d'abord, de la relation de réciprocité entre la ville et sa position. Une position favorable conditionne le développement rapide de la ville et ensuite c'est la ville qui commence, elle-même, à améliorer sa position afin de pouvoir exercer les fonctions de centre du système régional ³.

Il s'agit, ensuite, de la présence de certaines entreprises industrielles à profil varié, de cadres qualifiés, de même que de maintes unités de projections et de recherche scientifique, qui, ensemble, engendrent une réaction en chaîne conduisant au développement de nouvelles branches d'activité économique, contribuant à la réalisation d'une structure fonctionnelle de plus en plus complexe des villes et permettant aussi une utilisation plus variée de la force de travail.

Une place à part dans le réseau des grandes villes est détenue par la ville de Bucarest. Concentrant près de 1/5 de la population urbaine et plus de 17 % de la production industrielle, cette ville constitue le principal centre économique, administratif, culturel, scientifique et politique de la Roumanie. Sa population avait atteint, en 1970, le chiffre de 1 575 000 habitants, ce qui la situe parmi les 30 premières villes européennes à plus de 1 million d'habitants ⁴.

² L'accroissement de la population du groupe des grandes villes par l'accroissement de leur nombre a été de 36 % entre 1930 et 1948 ; de 55 % entre 1948 et 1956 ; de 59 % entre 1956 et 1966.

³ Il est intéressant à remarquer que la majorité des grandes villes (excepté Ploieşti, Braşov, Sibiu et Cluj) ont une position périphérique, à la proximité des frontières, ce qui leur a imprimé un développement rapide, en tant que principaux centres d'échanges économiques avec d'autres pays.

⁴ Par comparaison à d'autres capitales des États voisins, l'importance numérique de la population de Bucarest est relativement élevée — conséquence de l'excessive concentration qui caractérisait le passé. Sofia détenait 20,7 % de la population urbaine de tout le pays ; Prague 11,6 % ; Belgrade 12,2 % ; Berlin 8,7 % ; Varsovie 7,7 %. En échange, Budapest concentrait 41,7 % de la population urbaine du pays. En ce qui concerne le nombre d'habitants, Bucarest n'est dépassé que par la ville de Budapest (1 970 000 hab. en 1970). Parmi les autres capitales, Varsovie compte 1 289 000 hab. (1969), Prague 1 103 000 hab. (1969), Berlin 1 084 000 hab. (1969), Sofia 963 000 hab. en 1969, Belgrade 750 000 hab. (1968).

Au fur et à mesure de la réalisation d'une répartition territoriale plus rationnelle des forces productives, l'importance de la ville de Bucarest diminue, consécutivement à l'accroissement absolu du nombre des villes ayant plus de 100 000 habitants, et de l'accroissement du nombre moyen des habitants (de 101 400 habitants en 1930, à 166 500 habitants en 1970). En même temps, le poids de la ville de Bucarest dans le cadre des grandes villes a diminué de 68% en 1930 à 42,5% en 1970, ce qui tend à conférer au réseau urbain un caractère plus équilibré.

Chacune des 12 grandes villes — à l'exception de la capitale — ne dépasse pas, pour l'instant, le chiffre de 200 000 habitants, tandis que dans les autres pays voisins à la Roumanie, la Hongrie mise à part, le réseau des grandes villes est plus diversifié, tout en réduisant, de ce fait, la différence de grandeur entre la capitale et sa seconde ville — immédiatement suivante —, et influençant, à la fois, plus activement la division territoriale du travail entre les systèmes régionaux des localités urbaines. Si en Hongrie ce rapport est de 1 : 11,2, et en Roumanie de 1 : 7,3 fois, tous ces deux pays n'ayant pas d'autres villes intermédiaires avec plus de 200 000 habitants, en échange en Bulgarie, Sofia ne dépasse que de presque 4,4 fois la ville de Plovdiv (222 500 habitants), en Tchécoslovaquie le rapport entre Prague et Brno est de 1 : 3,1 fois, en République Démocratique Allemande (Berlin par comparaison à Leipzig) de 1 : 1,9 fois, en Pologne (Varsovie par rapport à Łódź) de 1 : 1,7 fois, en Yougoslavie (Belgrade par rapport à Zagreb) de 1 : 1,4 fois — tous ces pays ayant des villes avec 200 000—500 000 habitants, et même plus, en dehors de la capitale (République Démocratique Allemande : Leipzig et Dresde ; Yougoslavie : Zagreb ; Pologne : Łódź, Cracovie, Wrocław).

Dans les pays socialistes européens il y a, en totalité, 74 grandes villes, qui comptent presque 2/5 de la population urbaine de ces pays. Parmi celles-ci, 5 capitales — Budapest, Bucarest, Varsovie, Prague et Berlin — ont plus de 1 000 000 habitants ; 9 villes ont entre 500 000 et 1 000 000 habitants, et 14 villes, entre 200 000 et 500 000 habitants. L'accroissement du nombre des grandes villes est l'expression de l'amélioration continue de la structure territoriale de l'économie nationale dans le cadre de laquelle les grandes villes ont l'attribut de centre-pivot de la production⁵.

Si le nombre croissant des grandes villes exprime l'urbanisation en extension, le taux des villes à plus de 200 000 habitants — et surtout de celles à plus 500 000 — exprime le développement de l'urbanisation en profondeur, l'apparition des agglomérations urbaines. Ce phénomène est puissamment développé en République Démocratique Allemande et en République Populaire Polonaise.

Le processus de l'urbanisation présente, en général, deux étapes bien distinctes. Pendant la première étape a lieu le processus d'individualisation des différents types de villes, avec la prédominance de la concentration de plus en plus accentuée de la population et de la production matérielle

⁵ Les villes ayant plus de 200 000 habitants incluent 70,5% de la population des grandes villes en Pologne (10 du total de 24 grandes villes), 88,2% en Tchécoslovaquie (4 du total de 6), 70% en Yougoslavie (4 du total de 8), 80,2% en République Démocratique Allemande (6 du total de 11), 77,4% en Hongrie (1 du total de 5), 61,4% en Bulgarie (2 du total de 6) et 48,3% en Roumanie (2 du total de 13).

dans les grandes villes. Dans cette étape on valorise tous les avantages offerts par le processus de concentration, dans le but de l'obtention d'une haute productivité, et l'urbanisation est décisivement influencée par la répartition territoriale des forces productives et en premier lieu par l'industrie.

Ulérieurement, pendant la deuxième étape, en dehors du processus centripète de concentration de la production et de la population dans les grandes villes, on observe de manière de plus en plus distincte une tendance centrifuge d'extension des grandes villes, sous la forme des agglomérations urbaines. De ce fait, la forme classique de la ville isolée est remplacée par une nouvelle forme — le système régional urbain — qui comprend aussi bien des centres urbains de différentes grandeurs, que des centres ruraux étroitement liés du point de vue économique, administratif, culturel et social, à la ville principale.

Arrivées à un certain niveau de développement, les villes dépassent le cadre administratif rigide, donnant naissance au phénomène de rurbanisation du milieu rural⁶. La nouvelle forme d'urbanisation représente ainsi une négation dialectique de l'urbanisation classique, antérieure. En même temps, le rapport de réciprocité entre l'urbanisation et la répartition des forces productives change aussi, dans le sens que l'urbanisation (et surtout les grandes villes) n'est plus un résultat, mais, au contraire, devient un facteur déterminant de cette répartition territoriale et contribue à consolider les systèmes régionaux de localités urbaines, en tant que squelette économique du pays dans son entier. Parallèlement au rôle accru des grandes villes qui se transforment en centres de concentration industrielle, par la décentralisation et par le développement d'autres fonctions, non agricoles, a lieu l'intensification des fonctions de conduite, de service et de contrôle informationnel.

À ce point de vue, on peut considérer que les grandes villes de Roumanie se trouvent encore dans la première étape de développement. Il n'y a que Braşov, Ploieşti et, en moindre mesure, Constanţa, qui sont devenues des noyaux de microrégions urbanisées ou d'agglomérations urbaines.

Le degré de formation des agglomérations urbaines est étroitement lié au niveau de développement des principales fonctions urbanogènes — tout d'abord l'industrie —, qui influencent de manière active les formes de groupement des localités. Un indicateur de cet aspect est constitué par le coefficient de groupement des localités urbaines, représenté par le rapport entre le chiffre de la population totale des localités urbaines et rurales liées par des rapports de production et par la force de travail de la ville principale, et la population de cette dernière. Ce coefficient a des valeurs plus accentuées seulement dans le cas de Ploieşti (3.8) et de Braşov (2.4), tandis que pour les autres grandes villes ces valeurs varient entre 1.1. et 1.5.

De l'influence des grandes villes sur les systèmes de localités urbaines témoigne aussi le fait qu'autour de ces grandes villes avec une certaine

⁶ Dans ce sens il est à remarquer que seulement dans la période 1948—1970, le territoire administratif des grandes villes a augmenté de 1,5 fois.

structure fonctionnelle ont apparu de nombreuses petites villes. Ainsi, par exemple, autour de Braşov sont devenues villes les localités Codlea, Predeal, Săcele, Rîşnov et Zărneşti ; la ville de Ploieşti a stimulé l'apparition des villes de Băicoi, de Boldeşti-Scăieni et de Plopeni ; autour de Sibiu, les villes de Cisnădie et de Ocna Sibiului, etc.

Un autre indicateur de l'urbanisation, spécifique des grandes villes, est représenté par les déplacements journaliers des travailleurs. Ceux-ci expriment de manière directe la force d'attraction que les grandes villes en ascension rapide exercent sur les établissements humains urbains et ruraux de la zone environnante. Ce phénomène est en essor continu, bien que dans des proportions moindres qu'en certains pays voisins à la Roumanie. Dans des villes telles que Ploieşti, Braşov, Timişoara, Galaţi, 12 — 20 % des personnes travaillant dans différentes branches économiques proviennent d'autres localités (1966).

L'influence des grandes villes ne se borne, évidemment, pas seulement à ces villes situées à leur proximité immédiate. Le long des phases de formations des systèmes de localités urbaines, l'on peut observer l'interdépendance entre la micro-, la méso- et la macroposition économique de la grande ville. Au fur et à mesure du développement de la grande ville, la micro- et la mésoposition économique-géographique acquièrent de nouveaux éléments qualitatifs, et, en même temps, augmente aussi l'importance de la macroposition économique-géographique dans le cadre du système. Dans le cas de la macro- et de la mésoposition prédominante les liaisons concernant l'approvisionnement en matières premières et en force de travail, de même que les services destinés au territoire environnant ; dans le cas de la macroposition se situent au premier plan les rapports de production (coopération, livraison des produits semi-élaborés et des produits finis) et la desserte à un plan supérieur (institutions d'enseignement supérieur, institutions de projections, de recherche scientifique, etc.).

Les grandes villes présentent, dans leur développement rapide, une série d'aspects qui nécessitent une résolution optimale aussi bien en fonction de la valorisation des avantages offerts par cette catégorie de localités, que pour diminuer certains aspects négatifs qui pourraient apparaître avec le temps.

Tout d'abord s'impose la réalisation d'un rapport de grandeur plus équitable entre la ville de Bucarest et les autres grandes villes. À présent, la ville de Bucarest est de 7,3 fois plus grande que celle immédiatement suivante — Cluj, ce qui représente une légère amélioration de ce rapport, qui en 1948 était de 8,7. La réduction de ce décalage permet l'amplification du rôle des autres grandes villes dans le cadre des systèmes régionaux de localités.

Les grandes villes présentent des aspects démographiques tout à fait différents de ceux des autres catégories de localités. Ainsi, l'on observe un vieillissement de la population de ces villes, c'est-à-dire que le taux de la population du premier groupe (au-dessous de 15 ans) diminue de 22,5 % à 18 %, entre 1930 et 1966. Il est vrai que le taux de la population de plus de 60 ans s'est accru au compte de l'accroissement très rapide du groupe intermédiaire, donc de ceux aptes à travailler, et qu'à un moment donné le nombre de ceux de plus de 60 ans, qui sortent du cycle de la

production, sera supérieur à celui de ceux de moins de 14 ans, qui doivent entrer dans la production (tableau 1).

Tableau 1

La répartition de la population par groupes d'âges aux recensements de 1930, de 1956 et de 1966 (%)

Année	1930			1956			1966		
Groupes d'âges	0—14	15—59	Plus de 60	0—14	15—59	Plus de 60	0—14	15—59	Plus de 60
Total pays	33,5	59,1	7,4	27,2	62,5	9,9	26,0	61,7	12,3
Total villes	25,9	66,9	7,2	22,5	68,2	9,3	21,8	67,3	10,9
Grandes villes	22,5	70,5	7,3	21,4	63,1	15,5	18,0	70,3	11,7

Le caractère régressif de la structure démographique des grandes villes est illustré aussi par le coefficient de viabilité, qui représentait, en 1967, pour les grandes villes, seulement 89,5% par comparaison à la moyenne pour la totalité des villes, tandis que le nombre des enfants nés vivants par 1 000 femmes était, en 1966, de 82,7% de la moyenne totale des villes ou de 2 fois moins que dans le milieu rural.

L'accroissement naturel est, lui aussi, le plus petit par comparaison à celui des autres villes. En 1968 l'accroissement naturel de la population des grandes villes (à l'exception de Bucarest) représentait seulement 46,4% de l'accroissement de la population⁷.

Dans la période 1930—1966 on observe un décalage entre le processus de l'accroissement de la population et l'augmentation des ressources de travail. La population des grandes villes actuelles s'est accrue de 3,6 fois, par rapport à la population jeune — entre 0—14 ans — (1,6 fois seulement) et à la population apte à travailler — (15—59 ans) — (2 fois). De ce fait, la population de plus de 59 ans présente un accroissement plus rapide et la force de travail du milieu rural continue à être attirée dans les grandes villes pour les nécessités de l'économie nationale en plein essor.

À cela s'ajoutent, évidemment, aussi une série de facteurs limitatifs concernant le mouvement mécanique de la population, visant à éviter l'agglomération excessive de la population au dépens d'autres catégories de villes.

Dans des conditions pareilles, l'accroissement naturel devient insuffisant pour assurer, en perspective, un pourcentage rationnel des groupes d'âge aptes à travailler; il faut avoir en vue parfois même l'éventualité d'un dépeuplement futur — bien possible si des mesures pour remédier ces phénomènes négatifs ne seront prises d'avance.

Les aspects énumérés ci-dessus relèvent, pertinemment, que les grandes villes, par leur potentiel économique et social, exercent une

⁷ Trebici Vl., Gîndac I. D., Hristache I., *Aspecte ale fenomenelor demografice de tipuri de oraş*, dans Revista de statistică, 8, 1969.

influence primordiale sur tout le système des localités urbaines, directement ou par l'intermédiaire des villes génératrices de systèmes urbains de rang inférieur. C'est pourquoi l'étude des différents problèmes économico-géographiques du réseau urbain doit être abordée autant du point de vue structural, que du point de vue du système, en tant que manière d'analyse théorique.

Reçu le 25 janvier 1972

*Section de géographie économique
Institut de géographie de
l'Académie de la République Socialiste de Roumanie
Bucarest*

THE URBAN EVOLUTION OF TIMIȘOARA IN THE LAST CENTURY WITH SPECIAL EMPHASIS ON URBAN TRANSPORTATION

by A. CARANFIL

Urmărind evoluția urbană a unui mare oraș în ultimul secol, autorul și-a luat sarcina de a analiza etapele modernizării purtătorului — în sensul propriu — al vieții colective, transporturile. Alegerea nu a fost întâmplătoare, deoarece orașul realizează poate cea mai interesantă evoluție comparată a celor două aspecte neseparabile, dar întrunește și numeroase „premise” în ceea ce privește soluțiile adoptate, condițiile naturale și istorice de realizare etc.

Plecind de la evoluția rețelei de transport urban au fost cercetate următoarele etape de dezvoltare a orașului Timișoara : a) apariția primei linii de tramvai cu cai (1869) ; b) apariția tramvaiului electric (1899) ; c) diversificarea rețelei de transport (1930) ; d) apariția altor mijloace de transport public : troleibuzul și autobuzul (1941) ; e) modernizarea și extinderea rețelei.

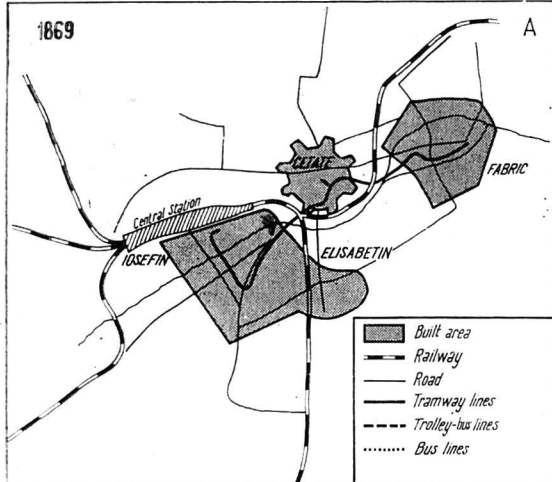
Located in the western part of Romania, in the centre of the Banat plain, Timișoara is, by the number of its inhabitants, the third town of Romania (207,000 inhabitants including its suburbs) and an important industrial, administrative, commercial and cultural centre and also a major knot of transport.

Although the birth of this settlement might be traced much farther back, yet the first document in which the city of Timiș is attested dates from the year 1266. It was here, at the crossing of numerous highways connecting the North with the South and the East with the West, that an important stronghold was erected. With time, this fortified site developed into a prosperous settlement known for its trade and handicraft activities.

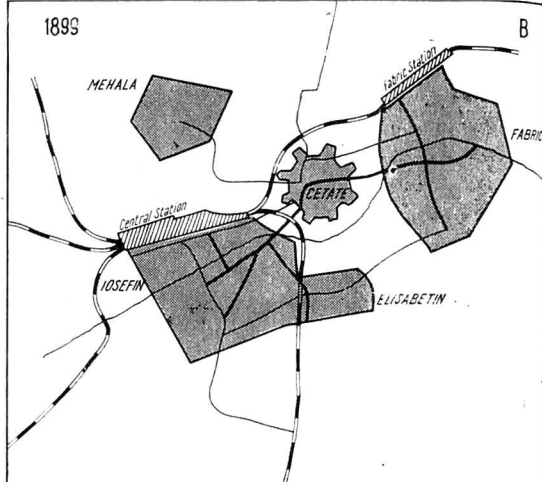
The development of the industrial and agricultural commodity production enhanced the circulation of goods, so that by the middle of the past century, Timișoara came to be the most important urban centre in the Banat (40,800 inhabitants in 1869). The extension of the railway transport in Transylvania did much to stimulate the town's economic progress and its building programme.

In the year 1869, when the tramway with horses started circulating, Timișoara had several factories i.e. spirits, paper, mills, bricks, large leather-

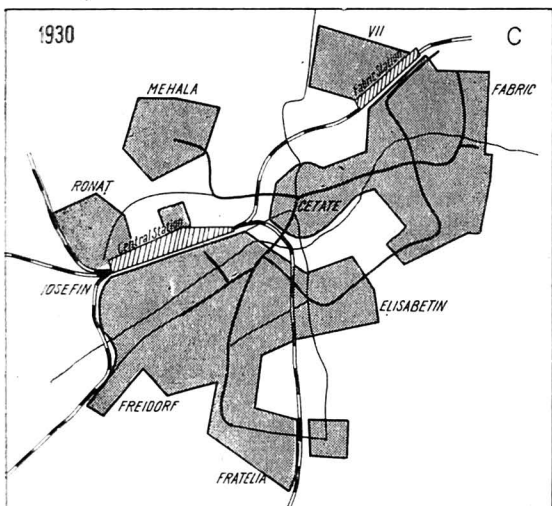
1869



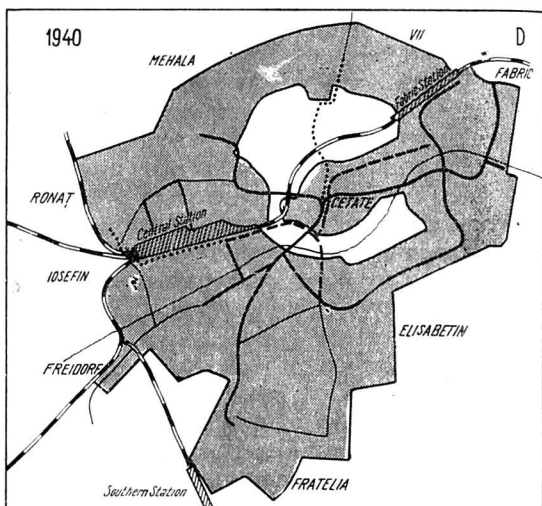
1893



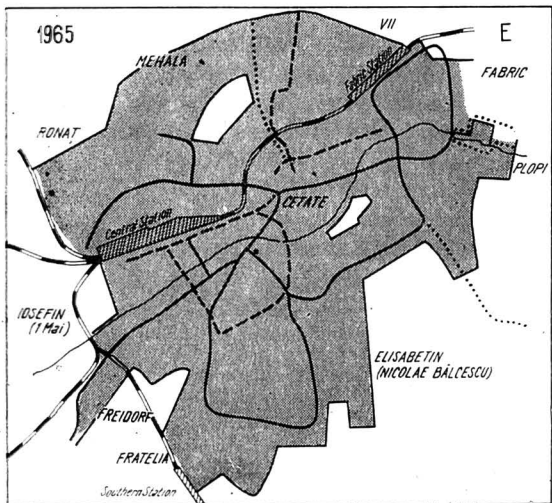
1930



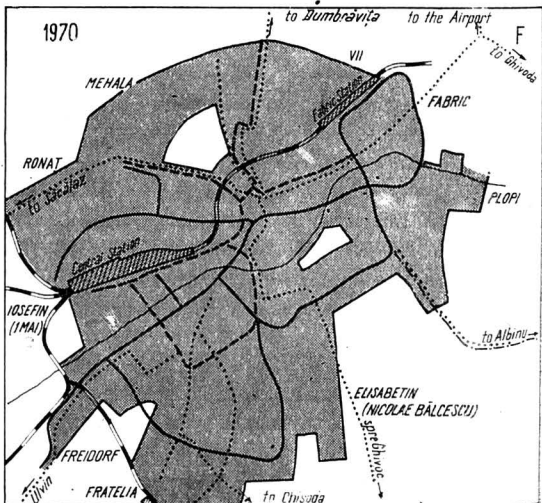
1940



1965



1970



processing workshops, textile mills, etc. At that time the town consisted of three districts, separated by cultivated areas (Fig. 1, A); in the centre there was the fortified zone, the *Cetate* (Stronghold), which had a military-administrative function; in the east there was the *Fabric* (Factory) district, in which there lived over two thirds of the total population and in which the whole industry and the workers' quarters were concentrated; in the west there was the *Josefin* district, whose functions were especially commercial and agrarian. This linear disposition of the three districts, with well differentiated functions, accounts for the route of the first tramway line, which connected the industrial zone with the administrative one, the commercial district with the town's railway station.

Characteristic of the last decades of the past century is the development of the industrial function (particularly textile, leather and food industries) in the *Fabric* district, the formation of new districts (*Mehala* and *Elisabetin*) with agrarian functions, the further improvement of railway lines (the industrial station *Fabric* was built), as well as the important updating of the town (it was here that electric lighting was introduced for the first time in Europe, and also a telephone net, etc.).

In the year 1899, when Timișoara numbered almost 60,000 inhabitants, the walls of the stronghold started being pulled down because they were a great hindrance to urban unity. The economic development and the increase of population as well as the expansion of the town area brought about an ever higher population mobility, so that with the extension of the tramway net the number of passengers rose to almost 900,000 in 1898 (Fig. 2). This situation made the horse tram traffic ever more difficult (Fig. 1, B), this being the only means of public transport that linked almost all the town's districts, except for the poorly populated *Mehala* zone. The year 1899 marks a turning point in the public transport system of Timișoara, namely, the entire net of tramways (10.3 km.) was electrified. In this way, the time required to cross the distance from east to west was reduced by one third as against horse traction (90 min.), and consequently, the number of passengers substantially increased (2.5 millions in 1901).

That is why the last years of the nineteenth century meant an important stage in the future evolution of the town. It started with the first urban planning project (1895), the construction of representative buildings (highly varied in style), development of the sewage system on the Bega river, drainage of swamps, functional restauration (development

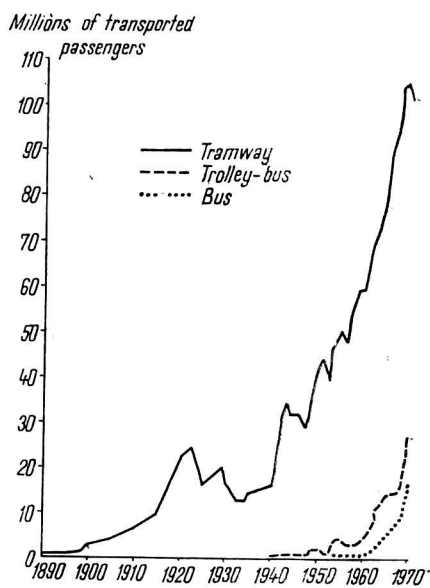


Fig. 2

of industry also in the other districts) and finally a growing trend toward urban unification (by the pulling down of fortifications, etc.).

The beginning of the twentieth century finds the town on the eve of some important economic changes : a) *industry* starts being diversified by the development of new branches (chemistry, metallurgy and mechanics) and by the specialization of traditional branches (food, textile and leather-processing); b) *trade* and credit institutions intensify their activity especially by exchange relations with the surrounding countries; c) the *railway transport* is extended, the town's station being at the time one of the most modern in Europe (in 1901 the daily traffic included 49 passenger trains and 30 goods trains). It should be remembered that the extension of external relations is materialized in the opening of a fast train line in 1905 (Orient Express and Simplon) and, in this way, Timișoara came to hold a favourable position on the Constantinople-Paris railway axis; d) *intensive agriculture* practised in the adjoining zone — irrigated cultures of vegetables, industrial plants and cereals which, besides a source of town supply, represented also an export commodity, so that Timișoara became also an important commodity market and a warehouse for agricultural products.

This evolution brought about a massive flow of manpower so that on the eve of World War I the town numbered over 75,000 inhabitants; consequently new districts were formed (*Ronaț, Fratelia*) and the old ones (*Fabric* and *Elisabetin*) were extended. That was the time when the first commutations started from Timișoara, people making use of the dense railway net. At the beginning of this century the town's industrial economy underwent a process of intense concentration and centralization; thus, in 1910, 60 per cent of the almost 12,000 workers were employed in modern industrial branches. Three fourths of them worked in enterprises with over 100 employees.

In spite of the fact that the requirements and volume of rapid displacements grew and the town area was extended, the tramway net was not developed, ticket costs being still prohibitive for a great many people. Throughout this period the lines remained the same, their number being doubled only on the highly circulated routes (1905 — 1915). This would explain also the rather slow growth of passengers (Fig. 2), viz. 9.8 millions in 1915.

After the year 1918, the completion of Romania's state unity favoured the upsurge of Timișoara's economy: new industrial branches were set up (electrotechnics, footwear, chemistry) and the traditional products were better put to account (textiles, foodstuffs, leather, etc.). At the same time, Timișoara became one of the most important commercial centres of the country.

The town's population was steadily increasing, particularly by the migration of people from the surrounding villages, so that in 1930 its number rose to over 91,000 inhabitants. Under these conditions the trend of urban development did no longer correspond to the requirements of a big modern city. The isolated evolution of the districts followed a network of streets, erroneously conceived, inherited from the time when the Stronghold towered over the outskirts. In addition, there was a very low building den-

sity, many waste areas between buildings, and an uneven distribution of industrial enterprises (except for the station zone).

Up to the year 1930 new districts were being formed along the highways (*Freidorf*) and were connected with the railway transport zones (*Vii*). A beginning of urban development took place in the direction south-north as a compensation for the uniformity of previous urban evolution. In that period the district of villas (*Elisabetin*) was widely extended (Fig. 1, C): parks were being built along the navigable course of the Bega river, and the town started looking more like a unitary organism.

Neither did urban transportation lag behind this renewal: the transport net was diversified and enlarged (18 km. in 1930), and the number of passengers doubled (18 millions) as against the pre-war period. Besides, the main tramway lines were replaced by Timișoara-made vehicles (1920 — 1922). Nevertheless, the consequences of the economic crisis (1929 — 1933) were felt also in the urban transport sector, the number of passengers decreasing (Fig. 2), only 30 — 40 per cent of the transport capacity being used.

In the year 1941, Timișoara ranked fourth among Romania's towns (after Bucharest, Iași and Cluj) having over 110,000 inhabitants. In the 40's the town developed by the expansion of the districts lying north and south of the former stronghold (Fig. 1, D). In spite of some areas in the median zones in which nothing was being built, one may speak of a true urban whole. A most spectacular development was recorded by the *Mehala* and *Ronaț* districts (specific agricultural and industrial, respectively). As regards urbanism it is important to mention that Timișoara-Beograd railway line was removed from the town's building perimeter, which facilitated the cohesion of the different zones. The demographic density, however, ranked still very low (36 inhab./ha), only 30 per cent of the total net of streets (over 300 km.) having their own sewage system.

It was the time when the network of public transport developed considerably: in 1932 the traffic went on round-the-clock; along a route of 3.5 km. there ran trolley-buses (1941), and later on buses. Although the tramway net was not improved, the number of passengers recorded a sudden increase after a long period of depression, so that by 1941 there were 23 million people using these means of transport (Fig. 2).

At the end of World War II, Timișoara registered a loss of population (pre-war levels being reached only one year — in 1948). The town was destroyed, its economy disorganized, and there was no planning project.

The town's economy started being rebuilt. The building programme had in view the necessity to rise the economic potential by strengthening the specialized traditional branches, by updating industry on the basis of highly skilled labour. Branches such as synthesis chemistry, precision mechanics, electrotechnics, man-made fibres, etc. have been developed. The industrial zones of the town were better delimited. Many enterprises located in the residential districts were closed.

In the town area urban development aimed at increasing population density with respect to the built-in area, so that the number of inhabitants/ha. reached the figure 50, which was still below the values recorded for Bucharest, Brașov, Cluj, Oradea and Sibiu. The town area was insigni-

ificantly extended, the new buildings being erected in the waste areas lying north and south of the former stronghold; even more was built in the already built-in zone of the town (Fig. 1, E and F).

The population rate was steadily increasing, 80 per cent coming from the adjoining villages; also skills flew in from other industrial centres. In 1971, Timișoara with its nearly 195,000 inhabitants was rated third in Romania after the towns of Bucharest and Cluj. It concentrated one third of the population of the Timiș county, whose residential city it is, three fourths of its industrial output and more than fifty per cent of the county's trade.

The most densely built-in area corresponds to the districts *Cetate, Fabric, 1 Mai (Josefin), N. Bălcescu (Elisabetin)* and the districts whose building index is lower. All these zones, isolated in the past from the centre of the town, have been harmoniously integrated in the urban complex (except for the *Ciarda Roșie* outskirts district which will be linked to the central part of the town). In fact the process of integration into the town area of some suburbs (*Ghiroda, Dumbrăvița, Chișoda*) numbering 20,000 people is still going on, but the trend toward a big urban centre is quite obvious.

With the intensification of urban life the index of population mobility rapidly increased; consequently the urban transport net had to be reshaped and modernized according to the pattern of rings, the major traffic having to be separated from the minor one.

The tramway net is used especially in the densely populated districts of the east-west axis and in the southern half of the town, whereas trolley-buses run especially along the central and northern zones. The bus traffic developed particularly in the last years especially on the routes connecting Timișoara with the villages surrounding it, their inhabitants working or shopping in town.

Timișoara may actually take pride in the best transport net of all Romania's provincial towns. The tendency to more intensively use the bus or trolley-bus has increased in the few past years.

At present there is a turning-point in Timișoara's urban progress and public transportation system, due to urban modernization and greater individual mobility.

REFERENCES

- GRISELINI F. (1926), *Istoria Banatului*, Timișoara.
 ILIEȘIU N. (1943), *Timișoara, monografie istorică*, Timișoara.
 DAICOVICIU C., PASCU Ș. (1963), *Din istoria Transilvaniei*, Ed. Academiei, Bucharest.
 * (1969), *Timișoara. Pagini din trecut și de azi*, Timișoara.

Received January 3, 1972

*Department of Economic Geography
 Institute of geography
 of the Academy of the Socialist Republic of Romania
 Bucharest*

FRUIT GROWING IN ROMANIA

by IOANA ȘTEFĂNESCU

Cultura pomilor fructiferi în România este o ramură de mare eficiență economică. Dat fiind volumul mare de produse și subproduse obținute și diversitatea acestora, cit și însemnătatea pe care o are pomicultura în cadrul economiei agricole a țării. În anii construcției socialiste, culturii pomilor fructiferi i s-a acordat o atenție deosebită. Ținând seama de caracteristicile condițiilor naturale care condiționează extinderea pomilor fructiferi, cu influențe directe asupra cantității și calității produselor, cit și de factorii economici, care au determinat anumite orientări, se delimitează zonele (Dealurile subcarpatice și piemontane ale Olteniei și Munteniei, dealurile din nord-vestul Transilvaniei, dealurile din vestul țării și sud-vestul Transilvaniei etc.) și bazinele pomicole (Dealurile din estul țării, dealurile din sud-estul Transilvaniei etc.) alte țări. Fiecare din acestea sînt analizate din punctul de vedere al repartiției geografice a culturii pomilor fructiferi, în funcție de factorii naturali și sociali economici predominanți, a structurii acestora, a producției, a greutății specifice în cadrul economiei pomicole a țării etc.

GENERAL CONSIDERATIONS

Fruit growing was carried on in Romania since days of old, as one of the traditional pursuits of rural economy. Written sources and travel notes record the abundance in fruits of the Romanian principalities. In his work *Descriptio Moldaviae*, Dimitrie Cantemir, prince of Moldavia, showed that there were so many fruits in his country that Polish invaders no longer brought food with them as they considered there were plenty of fruits to eat (Scarlat, Teodorescu, 1938). Paul d'Aleppo, Eolie Efendi and Del Chiaro (1718) were amazed by the plentifulness of fruits in Walachia and Moldavia and Cara and Schultzer enthusiastically wrote about the fruits of the Romanian Principalities. Cartographic documents of the 18th century (Austrian map, 1790, Hora von Oetzellowitz, 1790) and of the 19th century (Map of Southern Romania, 1864) record important areas covered by fruit on the hills of Oltenia, Muntenia and Moldavia. At the end of the 19th century, after huge forest clearings, fruit trees reached even higher altitudes, also extending along the main rivers, to the plain, where favorable conditions of development are met. The increase

of areas cultivated with fruit trees attained the highest point in the second decade of the 20th century, when Romania held the fourth place in Europa as concerns gross fruit production and the second place in fruit production per inhabitant (Constantinescu, Sonea, Bordeianu, Ioniță, 1955). Nevertheless, important fruit amounts could not be turned to account by export as they did not meet the required conditions. The absence of the corresponding planting material, of agrotechnical measures and of specialized units for turning to account fruit production led to the decay of this branch.

The great volume of products and subproducts and their diversity, as well as the importance of fruit growing for national economy required special attention from the State. Consequently, this important branch started being reconstructed in the years of socialist construction. Studies and investigations were carried out, aimed at placing different species and varieties in favourable economic and natural conditions and a steady activity was carried on with a view to replacing old plantations, to covering barren grounds from fruit tree orchards and to extending new plantations by the system of terraces. As a result of these measures, the area cultivated with fruit-trees amounted to 431,800 ha in 1970, which represents an increase as against the about 210,400 ha of 1948.

FRUIT-GROWING AREAS AND BASINS

The geographic distribution of fruit trees and their frequency on the agricultural land points out that there are massive orchard areas especially on the sub-Carpathian and piedmont hills of the country (Fig. 1). Species cannot be submitted to a clear-cut delineation, because of their interpenetration. The most appropriate zone for the cultivation of fruit trees is represented, however, by hills sheltered from winds, with podsol or brown forest soils, where conditions are favourable to plum-tree or apple-tree growing. Some varieties of plum-tree or apple-tree are also met in field areas, along watercourses, or on clayey-sandy soils, where they are mixed with apricot-trees.

Depending on the characteristics of natural conditions accounting for the spreading of fruit-trees, with direct influences on the fruit quantity and quality and on economic factors which determined certain orientations, *fruit-growing areas* and *basins* of Romania are delimited, each with its own features. In establishing those units account has been taken of: the area occupied by the utility category, representative enough to form a zone or basin, the concentration of compact fruit-growing areas, analysed by the weight of the respective category of the agricultural land, the culture tradition, tendencies or orientations in specialization, etc. To delineate the areas and basins, certain limits were taken into account. The minimum area covered by fruit-trees in a village is of 200 ha per area and 100 ha per basin; the weight in the agricultural field is thus of 10% and 5.1 and 7.5%, respectively.

FRUIT-GROWING ZONES

As concerns the geographic distribution of fruit trees and their frequency in the agricultural land, sub-Carpathian and piedmont hills of Muntenia and Oltenia rank first followed by the hills of north-west Transylvania and those of west and south-west Transylvania (Fig. 1). The spreading of fruit trees in these zones, amounting to about 74.3 % of the respective culture in the country, was obviously influenced by natural factors (relief, climate, soil, etc.) and by economic ones (high incomes, development of urban centres, creation of industrialization centres, development of means of conveyance etc.).

Sub-Carpathian and piedmont hills of Muntenia and Oltenia represent the most important fruit-growing zone of the country, as related to both the cultivated area and the number of fruit trees. The relief is gradually receding southwards and valleys are north-south oriented, which permits a longer sun-exposure of the slopes, favouring the development of fruit trees and their extension to 900 — 1000 m altitude. The mountain range, closing to the north the depressions along the main rivers, also permits the spreading of orchards and the cultivation of fruit-tree species with high climate requirements. The average temperature of January (-0.9°C at Turnu Severin and -2.9°C at Curtea de Argeş) does not hinder the culture of fruit trees, since high frosts occur very seldom. The warmest month of the year is July (18.4°C at Cîmpulung Muscel and 22.1°C at Rimnicu Sărat) yet in some parts (north-west of Oltenia) the warmest month is August. This is accounted for by abundant precipitations at the beginning of spring and autumn which delay atmosphere warming process and represent a favourable element of fruit development. Podsol soils, spread on high places and at the contact between hills and plain, brown forest and alluvial soils, favour the spreading of fruit trees, also influencing fruit production and quality.

In addition to relief, climate, soil, etc., an important place in the spreading of fruit trees was played by the development of the railway and road networks. The most important fruit-growing zone of the country could be directly linked to the towns placed in the contact zone between hills and plain. Those towns become the main consumers of the fruit production.

The area cultivated with fruit trees amounted to about 182,600 ha in 1970, which represented 40% of the respective culture of the country, concentrated on a territory of about 1/6 of the total surface of Romania. Favourable natural and economic conditions maintain more than 500 ha of fruit-growing area per village, in the central and eastern part (Fig. 1). In the western part, areas frequently range between 200 and 300 ha, which permitted to include that territory in the analysed fruit-growing area. The zone character is also due to the high frequency of fruit tree culture (on an average, between 20 and 30% of the agricultural land); these values are much exceeded in the central and eastern part.

The action of replacing old orchards and of extending new plantations by the system of terraces, resulted in an increase of the fruit-growing area in this zone with about 37,000 ha as against 1965. Important changes were also recorded by the structure of species.

The characteristic tree of the orchards in this area is the plum-tree (72.6 % of the total number of species), which ranks high above the country average (60.8 %). In some places (Argeș and Buzău basins, etc.), the plum-tree represents about 75 % of the total of species.

The apple-tree is spread on much smaller areas (11.2 % of the tree number), ranging under the country average (13.9 %). It shows a steady trend to decrease to the east of the zone, where it reaches 7.5 % (in the Buzău basin). In some parts — e.g. the Teleajen basin or the surroundings of the town of Rîmnicu Vilcea —, the apple-tree represents about 30 % of the total of species. Besides, in the middle course of the Buzău river, new plantations with 40 % apple-trees will contribute to increase its weight.

In sub-Carpathian and intracollinary depressions, the milder climate favours the development of huge plantations of fruit trees (Bistrița, Ocnele Mari, etc.) and of edible walnut-trees (Tismana). The other species, e. g. the pear-tree (4.8 % of the total of species), the cherry-tree and morello-tree (3.3 %), spread because of requirements determined by the fruit amount necessary for home consumption and export.

The extension of fruit tree areas in this zone will lay stress also in the future on the culture of plum-tree and apple-tree. The former proves to be the most suited species to pedoclimatic conditions, the weight of the latter increases thanks to its productivity and to economic requirements, determined by the demand for such products on the home market and abroad.

In 1970, 344,200 tons of fruits were produced in this area. The highest weight is that of plums (70.1 %), followed by apples (12.4 %), pears (4.9 %), cherries and morrelos (3.5 %), etc.

The creation and development of fruit-preserve factories in this zone (Vălenii de Munte, Băiculești, Topoloveni, Riureni, etc.) and the existence of numerous centres of fruit collecting and working (Rîmnicu Sărat, Dumitrești, Beceni, Buzău, Pîrscov, Pătîrlagele, Cislău, etc.) contributes to the industrial turning to account of fruits by the obtention of important fruit amounts — fresh, preserved, pulps, mares, juices, etc. —, very much demanded on the home market and abroad. Thus in addition to fresh fruits turned to account in the home market and abroad or to fruits used by wine-alcohol units to produce brandy, centres for fruit collecting and industrializing* produce important amounts of dry fruits (about 4,100 t), preserved (about 1,600 t), fruit pulp (about 8,900 t), mares (about 5,400 t), juices (about 450 t), etc. Out of the total production of dry fruits, about one third is meant for home consumption and two thirds for the foreign market. The main beneficiaries are the USSR, the Federal Republic of Germany, the German Democratic Republic, the Socialist Republic of Czechoslovakia, the Netherlands, etc. Fruit preserves are sent to the Federal Republic of Germany and to the German Democratic Republic, fruit pulps to the USSR, Austria, Switzerland, etc., and mares to the Federal Republic of Germany, the USSR, the Federal Republic of Yugoslavia, Austria, etc.

* The production of fruit preserve factories of the zone is not included, since they use raw materials from other regions as well.

The spreading of the new plantations of fruit trees, by reclaiming fields inadequate for other cultures and the improvement of old plantations by replacing old trees, may contribute to the development of this branch of intensive agriculture, which will result in the increase of fruit production and of the obtained income.

The zone of hills in the north-west of Transylvania coincides with the Someş Plateau. With the exception of closed depressions sheltered from winds (Baia Mare, Bistrița, etc.), the climate is generally colder. Yearly average temperatures (7.6°C at Vișeu de Sus and 9.1°C at Zalău) represent elements favouring the development of fruit trees in the conditions of yearly precipitations exceeding 600 mm. From a climatic standpoint, it is worthy of note that August (18.5°C at Bistrița and 19.1°C at Baia Mare) is cooler than July (19.1°C and 19.9°C , respectively), which has a positive effect on the development of fruits. Average temperatures in January (-2.5°C at Zalău and -4.6°C at Vișeu-de-Sus) do not destroy the respective culture, since high frosts are not known in some centres (Baia Mare, Bistrița, etc.). Podsol soils and podsolite alluvions, in addition to abundant precipitations (average mean 680 mm at Bistrița and 830 mm at Vișeu de Sus), are elements which favour the spreading of fruit-tree species.

An important role in intensifying the culture of fruit trees was played by the impetuous growth of the population of towns from that zone and from its immediate neighbourhood, which required high amounts of fruits for consumption, the development of fruit preserve factories (Baia Mare, Bistrița, Dej, etc.) and of centres for fruit collecting and working (Bistrița, Năsăud, Beclean, Șimleul Silvaniei, etc.).

Fruit-tree orchards in this zone amount to about 54,500 ha (13.7 % of the respective culture in the country). Fruit trees cover 200–300 ha per village on an average in fruit tree basins of Baia Mare, Șimleul Silvaniei and Dej, frequently exceeding 400 ha in the Bistrița basin (Fig. 1). The zonal character is revealed by the high incidence of fruit trees. On an average it ranges between 10.1 and 20.0 % of the agricultural field, sometimes exceeding 40.0 % (Fig. 2). The relatively low frequency of fruit trees in some areas is accounted for by the vast expanses of agricultural lands. The fruit-tree culture, beside animal breeding, remains the most important branch of agricultural economy, being the prevailing form of using the agricultural lands.

The action of recovering the fruit-tree patrimony brought an increase of about 14,800 ha in this zone, as compared to 1965. The new plantations also reveal changes in species structure. The prevailing tree in orchards is the apple-tree which represents 26.0 % of the species. Differentiations are much more obvious as concerns basins. Thus, with the exception of more limited basins (Țara Oașului), where the plum-tree still covers important areas, the apple-tree represents more than 70 % of the componence of orchards in the basins Baia Mare and Bistrița. The increased weight of the pear-tree is also worthy of note, reaching in some orchards (Seini, Șimleul Silvaniei, etc.), more than 10 % of the species componence. The milder climate of some depressions (Baia Mare) accounts for the presence of the edible walnut-tree and the higher local weight of the nut-tree (3.0 % of the total of fruit trees).

About 30% of the fruit amount obtained in 1970 (about 120,000 t) is meant for export (to the Socialist Republic of Czechoslovakia, the German Democratic Republic, Lebanon, etc.) and 70% is sent to the industrialization centres of the country and to the market supply. Enterprises for fruit industrialization and turning to account, existing in that zone, yearly produce important amounts of dry fruits (about 2,300 tons), fruit pulps (about 5,200 tons), mares (about 1,000 tons), etc. One third of these amounts is sent to export and two thirds for home consumption and industrialization.

The extension of orchards in this zone by the use of appropriate fields and species restructuration, depending on natural conditions and local economic requirements, contributes to the obtention of important fruit amounts of high economic value (apples, pears, etc.), required by the internal and external market.

Hills in the west of the country and in the south-west of Transylvania have a milder and damper climate (with yearly average temperatures of 9,7°C at Hunedoara and 10,5°C at Caransebeș) and provide conditions for the most varied and delicate species and varieties. The average temperatures of January the same as the very unfrequent occurrence of high frosts prevent tree freezing. Yearly precipitations (600 — 700 mm on an average), well distributed by seasons, the absence of strong winds, the abundance of phreatic waters at small depth and existing podsol soils, represent natural factors which condition the present-day distribution of fruit trees.

The presence of large urban centres (Arad, Deva, Hunedoara, etc.) and the existence of units for fruit working (Hățeg, Gurahonț, etc.), determined the spreading of orchards and the restructuring of species in the new plantations along the Cerna, Timiș, Mureș etc. Consequently, the surface cultivated with fruit trees amounted to about 45,900 ha in 1970 in this zone (10.6 % of the fruit-tree resources of the country), which represent an increase of about 6,800 ha as compared to 1965. In some regions (upper basin of the Timiș and of the Nera), surfaces cultivated with fruit trees in villages often exceed 500 ha (Fig. 1), which represents 30 — 40 % of the agricultural land (Fig. 2), while others (the middle and lower Mureș basin) remain between 300 and 400 ha.

The characteristic tree of orchards in this zone is the plum-tree (75.8 % of species componence), followed by the apple-tree (9.6%), cherry-tree and morello-tree (4.2%), pear-tree (2.8%), etc. In some areas (Almaj depression), one may notice the prevalence of the plum-tree (80% of the species), in others (surroundings of the towns of Hățeg, Caransebeș, Orăștie, Lipova, etc.) the increased weight of the apple-tree (30 — 40% of the species) and of the cherry-tree (pure orchards are met on high areas in some basins: Moldova Nouă, Caransebeș, etc.).

The yearly fruit production of this area amounted to about 89,000 tons in 1970, the highest weight being that of plums (73.9%), followed by apples (12.5%), pears (5.2%) cherries and morellos (6.4%) etc.

The great amount of high quality fruits exported from this zone accounts for the continuous trend observed in some plantations to spread apricot-tree and peach-tree culture, provided with optimum development conditions in the south-west of the zone.

FRUIT-GROWING BASINS

Fruit-growing basins comprise more reduced areas and are individualized by the high frequency of fruit trees and by their importance for national economy. Out of these, most important are : the hills of the west of the country and those in the south-east of Transylvania.

The hills in the east of the country are characterized by a fragmented relief, podsol soils and degraded chernozems with a colder climate, because of the lower yearly average temperatures (7.8°C at Fălticeni and 8.2°C at Tirgu-Neamț), moderate yearly precipitations (550 — 600 mm) and dry north-west winds supply favourable conditions for the development of fruit trees only in some closed basins, sheltered from cold currents. The main fruit-growing basins in the east of the country are the surroundings of Suceava and Fălticeni and the hills of Hirlău and Bîrlad.

The fruit-growing basins in the east of the country, representative for the varieties of apple-tree, plum-tree and cherry-tree are particularly localized along valleys, with a perpendicular direction on that of the prevailing wind, and in well sheltered depressions. In the hills in the east of the country, surfaces cultivated with fruit trees are smaller because of the frosts and late spring fogs, which destroy fruit crops.

The fruit tree characteristic of the surrounding of Suceava and Fălticeni is the apple-tree (38.4 % of the total). Its weight is steadily rising due to the demand of the home and foreign market.

In the orchards of the Hirlău hills, the plum-tree holds a prevailing place (44.7 % of the total), followed by the apple-tree (17.1%), pear-tree (7.1%), cherry-tree and morello-tree (13%), etc. In the Bîrlad plateau the apple-tree (15.9% of the species), the cherry-tree and morello-tree (13.4%) and the apricot-tree (7.4%) have started gaining an ever more prominent place.

The present-day componence of orchards on the hills from the east of the country is determined, however, by man's intervention, which is especially observed in the surroundings of highly populated centres, where species ratio is directly influenced by consumption requirements. Thus, in the surroundings of Iași, the cherry-tree represents 20 — 30% of the total of species, while the morello-tree and nut-tree rise to 10%.

The existence of important centres with high population in the east of the country (Iași, Suceava, Piatra Neamț, Bîrlad, etc.), as well as the presence of fruit factories (Suceava, Fălticeni, Tecuci, Focșani, etc.) and of numerous centres for fruit collecting and turning to account are factors which contribute to increase the surfaces cultivated with trees. In this respect, in the basins from the surroundings of the towns of Suceava and Fălticeni, on the hills of Hirlău, etc., important area with slope land, inadequate for other cultures are provided with slopes, in order to be suited for fruit-tree plantations.

Hills of the south-east of Transylvania, with a cold climate, because of cold currents, going down from the mountains supply favourable conditions for fruit trees only in well-closed depressions or along better sheltered valleys. Among these basins, of higher importance for local and national economy is the basin from the Sibiu surroundings, where fruit-tree cultivated areas are on an average between 300 and 500 ha per village

(Fig. 1). The apple-tree has a higher weight in species structure, followed by the plum-tree, morello-tree and pear-tree. In the south-west of Sibiu, the new species structure presents a higher frequency of the cherry-tree, apple-tree and pear-tree.

Local natural and economic conditions have permitted the individualizing of important fruit-tree basins along the Tirnava Mare, in the vicinity of Odorhei and Sighișoara, where in the species structure the apple-tree (23.8%), cherry-tree and morello-tree (8.7%), pear-tree (6.6%) etc. held an ever more important place.



The analysis of the main fruit-tree zones and basins in Romania points out that the spreading of fruit trees is the result of a complex of natural factors, influencing the product quantity and quality and of a complex of social-economic factors which determine the new species structure, depending on the population consumption requirements, on the raw material supply of industry and on export necessities.

Account being taken of the natural and economic conditions, particularly favourable to fruit growing, as well as the long-term practice in this branch, the optimum turning to account of the fruit-tree potential represents one of the imperious requirements of agriculture development of the sub-Carpathian and piedmont hills of Romania.

REFERENCES

- CONSTANTINESCU N., SONEA V., BORDEIANU T., IONIȚĂ C. (1955), *Regiunile pomicele din R.P.R. cu premisele pentru dezvoltarea în perspectivă a pomiculturii*. Ed. Academiei. Bucharest.
- MIHĂILESCU V. (1966), *Dealurile și cîmpiile României*, Ed. științifică, Bucharest.
- SCARLAT AL., TEODORESCU I. C. (1938), *Pomicultura în Enciclopedia României*, III. Bucharest.
- TUFESCU V. (1966), *Subcarpații*. Ed. științifică, Bucharest.
- „” (1961), *Clima Republicii Populare Române*, II, *Date climatologice*, Bucharest.

Received November 21, 1971

*Dept. of Economic Geography
Institute of Geography of the
Academy of the Socialist Republic of Romania
Bucharest*

LE DEUXIÈME COLLOQUE NATIONAL DE LA GÉOGRAPHIE DU TOURISME

Du 21 au 25 septembre 1971 ont eu lieu à Bucarest les travaux du *Deuxième colloque national de la géographie du tourisme*, organisé par l'Institut de géographie de l'Académie, en collaboration avec le Centre d'études et d'élaboration de projets pour le développement du tourisme du Ministère du Tourisme.

L'organisation d'une pareille manifestation doit être considérée comme la mise en pratique de l'un des desiderata exprimés au cours des travaux du premier colloque (septembre 1968), à savoir l'organisation de semblables réunions (même périodiques), qui constituent des facteurs de stimulation des préoccupations dans ce domaine et qui correspondent, d'autre part, aux nécessités d'orientation du développement de la géographie du tourisme (qui se trouve encore dans une phase préliminaire) et de consolidation unitaire de la base scientifique du tourisme. Pour répondre à de semblables préoccupations, les organisateurs ont essayé de dépasser la forme habituelle de déroulement des travaux, uniquement sur la base de communications (conformes bien entendu à une thématique limitative mais laissée à la latitude de chaque auteur dans sa façon de définir le sujet et d'aborder les problèmes), en stimulant la possibilité d'exprimer leurs opinions sur des problèmes annoncés au préalable. C'est pour cela qu'en plus des communications correspondant aux deux thèmes dont l'importance a été considérée comme tout à fait particulière—*Le développement des zones touristiques de la partie occidentale de la Roumanie; La circulation touristique internationale en Roumanie*—on a soumis aux discussions trois rapports (diffusés aux participants) reflétant la position des institutions organisatrices concernant trois problèmes principaux, à l'égard non seulement de la géographie du tourisme mais aussi de la pratique touristique actuelle : *La terminologie touristique, le matériel d'information touristique et la régionalisation touristique*.

En constatant l'existence de nombreuses erreurs dans l'utilisation de noms de lieux et de termes se rapportant à l'activité touristique, le rapport *Problèmes de la terminologie du tourisme* signale le péril d'une continuelle altération du trésor toponymique national et d'une déformation des termes par la répétition de leur utilisation incorrecte. L'élaboration de n'importe quel ouvrage, et surtout de ceux de grande diffusion (cartes, guides, nomenclateurs) nécessite, d'une part, un contrôle rigoureux de tout le matériel élaboré et, d'autre part, la collaboration de nombreux spécialistes pour la réalisation des travaux documentaires et des études d'importance majeure. L'utilisation de plus en plus fréquente et de plus en plus large de termes plus ou moins consacrés ainsi que l'introduction d'autres termes qui correspondent aux formes nouvelles de pratique du tourisme et aux dotations modernes prouvent la nécessité évidente de l'établissement d'une liste de tous ces termes et de leur signification, dans ce nouveau domaine d'activité.

La communication *Sur les guides et les cartes touristiques* a posé également le problème du contenu de tous les matériaux et travaux destinés à l'information touristique. Pour que les exigences d'une information facile, exacte et rapide soient accomplies, quand il s'agit de cartes,

guides, catalogues, etc., il faut respecter rigoureusement certaines normes de réalisation qui leur assurent un grand degré de *précision, d'expressivité et d'actualité*.

La troisième communication — *La régionalisation touristique du territoire de la Roumanie* — a posé le problème, tant discuté, de la régionalisation touristique, qui ne doit pas être considérée comme une opération de simple délimitation de territoires selon certaines caractéristiques, mais d'établissement d'unités qui se distinguent de l'ensemble du territoire par leurs fonctions touristiques et par la perspective de leur développement dans ce domaine. Les régions touristiques, en tant qu'unités fonctionnelles et, en même temps, de planification territoriale, sont différentes des divisions géographiques ou administratives du territoire et, au fur et à mesure de l'application de certaines mesures d'aménagement, sont en continuelle modification.

Les deux autres thèmes ont été examinés au cours de 36 communications (auxquelles il faut ajouter 6 communications présentées par les hôtes étrangers), ce qui prouve aussi bien l'intérêt manifesté pour une semblable réunion, que la grande attention accordée par de nombreux spécialistes aux problèmes du tourisme. Huit des communications consacrées aux Portes de Fer ont été faites à Turnu Severin (au cours d'une excursion dans le défilé du Danube, dans l'île Șimian et sur la vallée de la Cerna, excursion qui a été organisée en conclusion des travaux du colloque), ce qui a permis de discuter sur les lieux mêmes les éventuelles propositions concernant l'aménagement et le développement prioritaires de cette région. Ces communications ont tenté (en tenant compte de la région touristique des Portes de Fer, beaucoup plus étendue que celle indiquée par son nom) de concentrer l'intérêt sur les éléments naturels (*La Vallée de la Cerna, Tourisme actuel et en perspective; Possibilités de valorisation touristique du sud du Banat*) et humains (*Rétrospective, actualité et perspective du tourisme en Ollénie du nord-ouest; Les fêtes culturelles et folkloriques, attractions principales du tourisme dans le nord-ouest de l'Ollénie*), favorables au développement du tourisme, ainsi que sur les nouvelles conditions créées par l'aménagement hydrotechnique du Danube, en tant que prémisses de l'organisation et de la stimulation des flux touristiques internationaux (*Organisation touristique de la zone du complexe hydro-énergétique des Portes de Fer; Le défilé du Danube, zone touristique et tracé de circulation internationale; Tourisme dans le secteur yougoslave des Portes de Fer*).

Les communications ont prouvé que nous nous trouvons encore dans la phase d'établissement et d'évaluation du potentiel touristique du pays, car nombreuses sont celles qui ont spécialement en vue la mise en évidence des valeurs touristiques d'un territoire déterminé, même si elles se sont limitées à une appréciation sommaire de celles-ci (*Les problèmes de géographie du tourisme dans le département de Bihor; Le potentiel touristique du département d'Arad; Le potentiel touristique de la vallée de la Nera; Considérations sur le potentiel touristique de la vallée du Mureș, entre Deva et Nădlac, etc.*) ou à la prise en considération, dans leur totalité, de certaines explications causales et de certaines analyses sur les possibilités d'organisation du territoire en vue d'atteindre des objectifs touristiques (*Relation entre la structure géologique et le tourisme dans les Carpates de Transylvanie; Les conditions climatiques favorables au développement de l'activité touristique dans le massif Bihor—Vlădeasa; Le potentiel touristique du département Alba; Propositions d'organisation des grands parcs naturels dans l'ouest du pays; L'activité cynégétique provenant des fonds de chasse du versant sud des monts Vîlcău, élément de diversification et d'encouragement du tourisme au nord de l'Ollénie, etc.*).

L'augmentation et la diversification des dotations conduisent à une intensification rapide des activités touristiques (*Perspectives touristiques dans le département de Timiș*), mais l'urbanisation et le développement du paysage industriel imposent de nouvelles orientations dans les zones préurbaines et surtout dans l'établissement et l'aménagement des emplacements destinés aux loisirs (*Pollutions industrielles du milieu et leurs implications dans la mise en valeur touristique du territoire*).

La Roumanie, étant un pays visité par de nombreux touristes et qui sert aussi de transit, se trouve parmi les pays ayant une dynamique élevée de circulation touristique internationale.

Le phénomène impose des analyses partielles ou totales dont les conclusions mettent en évidence les grandes possibilités d'accroissement des flux internationaux, mais qui implique l'application d'un programme rigoureux pour la réalisation de la base matérielle qui doit correspondre aux exigences de la circulation touristique future.

En abordant surtout des problèmes généraux théoriques et méthodologiques, les communications des hôtes étrangers ont contribué à l'animation des discussions ayant pour objet l'adoption de formes plus efficaces destinées au soutien et au développement du tourisme, en concordance avec les particularités du territoire (*Contribution à l'établissement de la méthodologie des études concernant le développement touristique du territoire*) ou de délimitation plus précise des catégories territoriales servant d'instruments de travail nécessaires à tous ceux qui prennent part à l'aménagement touristique du territoire (*Considérations sur la régionalisation touristique; Considérations sur la terminologie dans le domaine de la géographie du tourisme*).

La variété des problèmes posés dans les communications et au cours des discussions a permis de reconfirmer non seulement le désir de participation active des divers spécialistes à la constitution d'une base scientifique aussi considérable que possible du tourisme, mais aussi la nécessité d'une direction unitaire par une semblable activité. Seules des actions diversifiées, bien coordonnées, sont en mesure de résoudre le mieux possible ces activités, en faisant appel à des spécialistes provenant de domaines d'activité les plus variés et qui, en collaborant, sont en mesure d'obtenir un rendement maximum du potentiel touristique.

LUCIAN BADEA

T. MORARIU et VALERIA VELCEA, *Principii și metode de cercetare în geografia fizică* (Principes et méthodes de recherche dans la géographie physique), Ed. Academiei, Bucarest, 1971, 284 p., 164 fig. et photos.

L'ouvrage des deux professeurs des Universités de Cluj et de Bucarest joint les brillantes traditions de la méthode propre à la recherche géographique, établie par S. Mehedinți et continuée par ses remarquables disciples, aux idées nouvelles imposées par la diversification actuelle des domaines de la géographie physique et les travaux de plus en plus approfondis de la recherche contemporaine. Si la géographie physique (et il en est de même pour la géographie économique) a sans cesse précisé, ces derniers temps, les caractéristiques de la triple orientation concernant la recherche fondamentale, le côté informatif et celui de l'application, la recherche n'appartient pas uniquement à la première de ces orientations, mais est indispensable à toutes les autres. Des réalisations satisfaisantes ne sont possibles ni dans le domaine informatif ni dans celui de l'application sans une parfaite connaissance de tous les composants de la nature des lieux et, ajoutons-nous, de la *nature transformée anthropiquement*, ce qui, en fait, constitue l'environnement. Cette différenciation de la triple perspective dans laquelle on examine le même domaine de la recherche, le territoire, crée actuellement pour la méthodologie géographique une thématique plus complexe que celle du passé. Bien plus, l'évolution de toutes les sciences vers la précision quantitative a également introduit dans la géographie les méthodes statistiques-mathématiques, un grand nombre d'analyses, des systèmes bien plus complexes d'élaboration des cartes, des expériences poursuivies dans des stations, etc. Tout ceci exige des précisions et les auteurs de l'ouvrage ne manquent pas de les donner avec compétence. Ce livre accumule l'expérience de cadres didactiques éminents, clairement exprimée, logiquement élaborée et assortie d'une très instructive représentation graphique des phénomènes. Aussi constitue-t-il un guide utile non seulement pour les jeunes géographes qui découvrent grâce à lui les phénomènes de la nature dans leur magnifique interaction, mais aussi pour les spécialistes plus avancés, ceux qui préparent leur thèse de doctorat, car ils y trouvent un vaste champ où se confrontent les opinions, ainsi que des procédés de travail et des façons d'aborder certains problèmes.

Après une partie générale qui expose des principes et des méthodes (on y définit le cadre et les conditions de la recherche dans la géographie physique, la nécessité d'une finalité applicative des recherches, les méthodes utilisées par la recherche et la représentation cartographique — auxiliaire de la recherche), on passe à la manière dont il faut aborder l'étude des unités territoriales. En partant du relief comme élément de base, on examine tous les composants de la nature des lieux en étroite interdépendance. Celle-ci est la partie essentielle de l'ouvrage

(près de 200 pages) où l'on étudie les éléments les plus suggestifs du complexe géographique : les plaines inondables, les terrasses, les interfluves, les piémonts, ainsi que certains processus propres à la dynamique de leur développement actuel (glissements de terrains, torrents, dynamique des rivages) ou passé (la glaciation quaternaire avec les formes qu'elle a engendrées). Cette partie finit avec la présentation d'un exemple de complexe territorial spécifique — les dépressions, où l'on retrouve un grand nombre d'éléments exposés antérieurement, et ainsi on aborde le problème de la régionalisation géographique.

Le matériel disposé dans cet ordre donne à l'ouvrage une unité et lui assure un fil conducteur. Il dépasse les attributions d'un guide de la recherche et se présente comme une œuvre de directives de la pensée géographique, qui informe sur les nouveaux courants d'opinions. Grâce à cet aspect, l'apparition de cet ouvrage enrichit la bibliographie géographique roumaine en ce qui concerne la partie théorique. Le résumé final, en anglais (un peu trop bref) le recommande également aux lecteurs étrangers.

V. TUFESCU

Institut de géographie de l'Académie de la République Socialiste de Roumanie, *Piémontul Gêtic, studiu de geografie economică* (Le Piémont Gétique, étude de géographie économique). Ed. Academiei, Bucarest, 1971, 320 pages, 82 figures.

L'ouvrage présenté contient 320 pages et 82 figures (esquisses cartographiques, diagrammes, graphiques, photos) et a été rédigé par un collectif de géographes appartenant à la section de géographie économique de l'Institut de géographie de l'Académie de la République Socialiste de Roumanie.

Le comité de rédaction qui a coordonné l'ouvrage a eu comme rédacteur responsable le D^r I. Velcea et comme membres I. Băcănaru, le D^r I. S. Gruescu et Gh. Iacob. Le collectif a également bénéficié de la collaboration de quelques géographes physiciens, tels que le D^r L. Badca (pour le relief), Gh. Neamu (pour le climat), le D^r P. Gâştescu (pour la hydrographie) et Alexandra Bunescu (pour les sols, la végétation, la faune), auteurs du 11^e chapitre de l'ouvrage, qui présente le cadre physique-géographique, chapitre de base sur lequel se fondent les recherches et les résultats obtenus par les 12 géographes économistes qui portent le poids de la responsabilité qu'implique l'élaboration de cet important ouvrage économique et géographique auquel on a travaillé, sans négliger les autres activités, près de quatre ans.

Le professeur Vintilă Mihăilescu a également participé à la rédaction et son expérience dans le domaine de la géographie économique et dans celui de la géographie physique se reflète dès le premier chapitre, auquel il a collaboré (*Le Piémont Gétique — unité géographique dans le cadre de la Roumanie*) — bref exposé théorique concernant le concept physique-géographique de piémont et ses implications de géographie humaine et économique. On ébauche également dans ce chapitre les larges traits physiques-géographiques et économiques des principaux compartiments du Piémont Gétique, considérés parallèlement sous un triple aspect : génétique, géomorphologique et économique. Ainsi, on distingue : le piémont collinaire (les Subcarpatés Gétiques), avec des conditions et des ressources de transition entre la montagne et les collines, et le piémont vestige (le Plateau Gétique), avec des collines douces et des plaines piémontanes, où l'influence de la montagne est réduite de beaucoup. Des ressources minérales,

hydroénergétiques, forestières et fourragères correspondent à la première unité, tandis que dans la deuxième on remarque la présence des cultures agricoles, viticoles, pomicoles, des combustibles minéraux, ainsi que d'une industrie destinée à la transformation de ces produits. La circulation entre ces deux unités piémontanes, facilitée par le réseau hydrographique, assure, en quelque sorte, une unité économique relative due à l'influence exercée par la montagne (par exemple la transhumance) sur tous les compartiments du piémont.

Etude collective à caractère monographique, *Le Piémont Gétique* est divisé en deux parties distinctes : la partie générale traite de la géographie de la population de l'habitat humain (I. Băcănaru, Niculina Baranovschi, A. Caranfil, Constanța Rusenescu et D. Bugă), de la géographie de l'utilisation du territoire (I. Velcea, Gh. Iacob et I. Iordan) et de la géographie de l'industrie (Alexandra Ghenovici, I. S. Gruiescu, P. Deică, Aurelia Barco et I. Băcănaru); dans la partie régionale on caractérise du point de vue économique les huit sous-unités de cette unité géographique complexe connue sous le nom de Piémont Gétique, à savoir : les Subcarpates de Gorj, les Subcarpates de Vilcea, les Muscelule Argesului, le Piémont du Motru, celui de l'Oltet, le Piémont de Cotmeana, celui de Cindești et la haute plaine de Bălăcița. Rédigées selon un plan relativement uniforme, imposé par la nécessité de coordination exigée par le travail d'un collectif important, les caractérisations permettent de mettre en évidence le spécifique de chaque unité piémontane. Il faut mentionner ici le caractère géographique informatif dominant, propre à cette partie de l'ouvrage.

Le matériel exposé ne constitue pas une simple annexe documentaire; il est présenté dans son interdépendance organique et justifie pleinement les caractérisations d'ensemble par domaines économiques-géographiques concernant tout le piémont décrit dans la partie générale. Par cet aspect de géographie appliquée, les auteurs ont justifié l'espoir que cette deuxième partie sera capable de répondre, dans une plus grande mesure, au besoin de documentation exprimé par les auteurs de projets, les architectes, les spécialistes de la systématisation.

Imprimé en 1971, *Le Piémont Gétique* a paru en même temps que la IV^e édition du colloque franco-roumain, qui s'est déroulé à Bucarest en octobre 1971 et a eu comme thématique « l'étude géographique des piémonts ». Ainsi, cet ouvrage s'affirme non seulement comme une première synthèse économique-géographique roumaine concernant une unité géographique roumaine, mais aussi comme un apport d'ordre théorique dans un problème qui dépasse, par son intérêt scientifique, les limites de la Roumanie et est soumis à l'examen d'autorités internationales en la matière.

N. AL. RĂDULESCU

M. C. BĂCESCU, G. I. MÜLLER, M. T. GOMOIU, *Ecologie marină. Vol. IV, Cercetări de ecologie bentală în Marea Neagră* (Marine ecology. Vol. IV, Researches of benthal ecology in the Black Sea), Ed. Academiei, Bucharest, 1971, 359 p., 16 plates.

The series of "Marine Ecology" that came out some years ago on the initiative of a research group, as part of the Academy section for marine biology, under the guidance of professor Băcescu, was enriched, by the volume we present, with a new and competent work concerning the benthal fauna as against the natural environment of the continental Romanian platform. For the ecologic presentation of the biocoenoses on the sea ground one has to

resort first to the characterization of the surrounding conditions, insisting especially upon the description of the marine sediments, as well as on the relationship existing between the life zones and the masses of water as regards the temperature, salinity, the dissolved oxygen, or the water dynamics: waves and currents.

The map of the main biocoenoses and other ones, concerning the benthal populations clusters spreading on the continental platform in front of the Romanian shores or on the whole shelf zone in the western part of the Black Sea, the over 30 charts which comprise the fauna close by the sea ground in inventory lists accompanied by zoogeographical data, as well as the 85 substantial annex pages, which include the main data of the biomass and of the surrounding factors (the nature of the substratum, the temperature, salinity) enrich the work and offer us not only the conclusions of a laborious research activity, but also a valuable documentary and comparative material. From the biological point of view and as concerns the dependence on the environment, the work is interesting not only for the biologists but also for the geography researchers (hydrologists, zoogeographers) who are concerned with problems of the littoral and marine field.

O. ŞELARIU

Pour toute commande de l'étranger
(fascicules ou abonnements) s'adresser à
ROMPRESFILATELIA
Boîte postale 2001 — telex 011631
BUCAREST — ROUMANIE
ou bien à ses représentants à l'étranger :

ALBANIE, Ndërmaja Shtetëtrora E., Tregëtimit Të Librit, Tirana ; RÉPUBLIQUE DÉMOCRATIQUE ALLEMANDE, Deutscher Buch-Export-und-Import, Leninstrasse 16, Leipzig C, 1 ; REPUBLIQUE FÉDÉRALE D'ALLEMAGNE, Kubon Sagner, B.P. 68, München 24 ; Reise und Verkehrsverlag Hönigwiesenstrasse, 25, 7 Stuttgart-Vaihingen ; Zumsteins Landkartenhaus, Liebherrstrasse, 5, 8 München 22 ; REPUBLIQUE ARABE UNIE, Dar El Tahrir et Publishing 21 Kasr et Nill St., (Dar el Shark Bookshop), Cairo ; AUTRICHE, Globus Buchvertrieb, Salzgies 16, Wien I ; BELGIQUE, Du Monde Entier, 6, Place St. Jean, Bruxelles ; Librairie Claeys-Verheughe, 8, Volderstraat, Gand ; Maison de Langues Vivantes, 65, rue du Midi, Bruxelles ; Office International de Librairie, 30, Av. Marnix, Bruxelles 5 ; Vander Editeur, 10, Munstraat, Louvain ; BULGARIE, Hemus, Pl. Slaveikov, 11-Sofia ; CANADA, Canadian Slavic Studies, Loyola College, Montreal 262 ; Librairie Lides Inc., 1083 Van Home, Montreal ; Panonia Books, 2, Spadina Road, Toronto, 4, Ontario ; CHINE, Waiwen Shudian, B.P. 88, Pekin ; COLOMBIE, Libreria Karl-Buchholz, Av. Jimenez 8—40, Bogota ; RÉPUBLIQUE DÉMOCRATIQUE POPULAIRE DE CORÉE, Chulpanmul ; CUBA, Cubartimpex ; P.O. Box 6540, La Habana ; DANEMARK, Munsgaard, 6 Norregade, Copenhagen K. ; N.J. Haases-Bogimport, 8, Loerstræde, Copenhagen K. ; ESPAGNE, Libreria Bucholz, Paseo de Recoletos, Madrid ; Libreria Científica General, Preciados no. 48, Madrid 13 ; ETATS-UNIS D'AMÉRIQUE, Angelescu Book Service, 3645, Barham Street, Detroit 24, Michigan ; American Chemical Society, 1155, Sixteenth Street, NW Washington DC 20036 ; Fam Book Service, 69, Fifth Avenue Suite 8 F, New York 10003, N.Y., Franklin Syuare-Subscription, Agency, Teaneck (New Jersey 07666) ; Q.S. Heinman, 400, East 72nd Street, New York, 21, N.Y. ; McGraw-Hill Book Company, 330, West 42nd Street, New York, N.Y. 10036 ; Moore-Cottrell Subscr. Agency, North Cohocton, New York 14868 ; Nicoară Travel Service, 17432, Woodward Ave. Detroit, Michigan 4803 ; Shoenhof's Foreign Books, Inc., 1280, Massachusetts Avenue, Cambridge, Massachusetts 02138 ; Henry M. Snyder Co. Inc., 440 Fourth Avenue, New York, N.Y. 10016 ; Twayne Publishers, Inc., 31 Union Square West, New York, 3, N.Y. ; Zeiten & Ver Brugge, Booksellers, 815 No. La Cienaga BLVD, Los Angeles 69, California ; FINLANDE, Akateeminen Kirjakauppa, Postfach 10128, Helsinki 10 ; FRANCE, Agence Littéraire et Artistique, Parisienne, 7, rue Debelleyne, Paris 3-e ; Eyrolles Editeur, 61, Bd. St.-Germain, Paris 5-e ; Librairie de l'enseignement technique (Stand permanent des livres techniques et scientifiques roumains) 61, Bd. St.-Germain, Paris 5-e ; Librairie Hachette, 5, rue des Cevennes, Paris 5-e ; Librairie Joseph Gilbert, 20—30, Bd. Saint-Michel Paris 6-e ; Libella, 12, rue Saint-Louis-en-l'Île, Paris 5-e ; Maison du Livre Italien, 46, rue des Ecoles, Paris 5-e ; Office International de Documentation et Librairie, 48, rue Gay-Lussac, Paris 5-e ; Presses Universitaires de France, 17, rue Soufflot, Paris 5-e ; GRANDE-BRETAGNE, Bailey Bros & Swinfin Ltd. Warner House, 48, Upper Thames Street, London E.C.4 City 6521 ; Blackwell's Foreign Department, Broad Street, Oxford ; Central Books Ltd., 37, Grays Inn Road, London W.C.1 ; Collet's Holdings Ltd., Denington Estate, London Road, Wellingborough, Northants ; N & G. Foyle Ltd., 119—125 Charing Cross Road, London W.C.2 ; Parker & Son, 103, Walton Street, Oxford ; HONGRIE, Kultura, Fő útca 32, Budapest 1 ; ISRAËL, Haifepac Ltd., 11, Arlosorov St., Haifa ; Lepac Ltd., 15, Rambam St., Tel-Aviv ; Lotus Ltd., Achad Haam St., Tel-Aviv ; ITALIE, SO. CO. LIBRI Export-Import, Piazza Margana 33, Roma ; JAPON, Maruzen Ltd., 6 Tory Michome, Nihombashi, Tokyo ; Nauka Ltd., Imp. Departm., 30—19 Minami Ikebukuro, 2, Chome, Toshima-Ku, Tokyo ; MEXIQUE, Editorial Grijalbo S. A. Apartado 285668, Mexico, 17, D.F. ; MONGOLIE, Mongolgosknigotorg, Ulan Bator ; NORVÈGE, Norsk Bokimport, Postboks 3267, Oslo ; PAYS-BAS, Antiquariat Junk, Walderstraat 10, Lochen ; Boekhandel Pegasus, Leidestraat 25, Amsterdam ; Intertaal, Van Baerlesstraat 150, Amsterdam Zuit ; Meulenhoff, Beulingstraat 2, Amsterdam C ; Swets Zeitlinger, Keizergracht 471—487, Amsterdam ; POLOGNE, Ars Polona, Krakowskie Przedmiescie 7, Warszawa ; PORTUGAL, Libreria Bucholz, Avenida Libertade, Lisboa ; SUÈDE, Almqvist & Wiksell, 26, Gamla Brogatan, Stockholm, K. ; C.E. Fritze, Fredgatan 2, Stockholm 16 ; Gumperts AB, B.P. 346, Göteborg I ; SUISSE, Fachbucherei, Postfach 1420, 3001—Bern ; Herbert Lang, Erke Munzgraben 2, Bern ; Librairie Payot, 1, Rue de Bourg Ch—1002, Lausanne, Librairie Rousseau, 26, Rue Jean-Jacques Rousseau, Genève ; Pinkus & Co., Froschgasse 7, Zürich I ; TCHÉCOSLOVAQUIE, Artia, Ve Smerckach 30, Praha I ; U.R.S.S., Mejdunarodnaia Kniga, Moscou G—200 ; RÉPUBLIQUE DÉMOCRATIQUE DU VIETNAM, Xunhasaba, 32, Hai Ba Trung, Hanoi ; YOUGOSLAVIE, Forum. V. Misika, 1, Novi Sad ; Jugoslovenska Knjiga, Terazije, 27, Beograd ; Libertatea. Z. Zrenjanina, 7, Pancevo ; Prosveta, Terazije 16 I, Beograd.

TRAVAUX PARUS AUX ÉDITIONS DE L'ACADÉMIE
DE LA RÉPUBLIQUE SOCIALISTE DE ROUMANIE

- L. BADEA, N. CALOIANU, GH. DRAGU, **Județul Sibiu** (Le département de Sibiu), 1971, 145 p., 35 fig. + 1 carte, 15 lei.
- M. IANCU et collab., **Județul Brașov** (Le département de Brașov), 1971, 161 p., 48 fig. + 1 carte, 15 lei.
- CRISTACHE STAN, OCTAVIA BOGDAN, **Județul Ialomița** (Le département de Ialomița), 1971, 151 p., 45 fig. + 1 carte, 15 lei.
- T. MORARIU, VALERIA VELCEA, **Principii și metode de cercetare în geografia fizică** (Principes et méthodes de recherches dans la géographie physique), 1971, 280 p. + 164 fig., 20,50 lei.
- * * * **Piemontul getic. Studiul de geografie economică** (Le Piémont gétique. Etude de géographie économique), 1971, 320 p. + 129 fig., 15,50 lei.
- P. GĂȘTESCU, **Lacurile din România. Limnologie generală** (Les lacs de Roumanie. Limnologie générale), 1971, 372 p., 95 fig. + 31 pl., 29 lei.
- IOANA ȘTEFĂNESCU, **Subcarpații dintre Sușița, Zăbrăuț și Buzău. Studiul geografico-economic** (Les Subcarpates entre Sușița, Zăbrăuț et Buzău. Etude géographico-économique), 1972, 290 p., 54 + fig., 13,50 lei.
- IOAN GRUESCU, **Gruparea industrială Hunedoara — Valea Jiului** (Le groupement industriel Hunedoara — Valea Jiului), 1972, 160 p., + 50 fig., 9 lei.

À PARAÎTRE

- ION MAC, **Subcarpații transilvăneni dintre Mureș și Olt. Studiul geomorfologie** (Les Subcarpates transylvaines entre le Mureș et l'Olt. Etude géomorphologique).
- ATENA HERBST-RĂDOI, **Populația Dobrogei** (La population de la Dobrogea).

Rev. Roum. Géol., Géophys. et Géogr. — Série de GÉOGRAPHIE, Tome 16, No 1,
p. 1—140, 1972, Bucarest



I.P.I. c 1233

43 477

Lei 25. —