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SIEBENGEBIRGE NATURE RESERVE (Federal Republic of Germany)

On-the-spot appraisal by Prof. F. Bruno

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1. THE PHYSICAL AND BIOLOGICAL ENVIRONMENT

1.1 The territory

The Siebengebirge nature reserve is one of the most esteemed and famous in Germany. It is situated on the right hand side of the river Rhine, in the region of the cities of Bad Honnef, Königswinter and Bonn, from whose centre it lies at a distance of from 12 to 15 kms. It comprises an irregularly dispersed series of cone-shaped hills with very clear connections between the landscape of the valleys - a direct result of the tuffaceous cover which surrounds it and which doubtlessly lead the visitor immediately into recognising this as an area of volcanic origin.

The volcanic region of Siebengebirge is between 6 and 7 kms in diameter and is made up of hills whose altitudes range, for the greater part, between 300 and 400 metres.

The most notable and highest hills are the "Drachenfels" (320 m. asl), the "Wolkenburg" (324 m. asl), the "Petersberg" (331 m. asl), the "Nommenstromberg" (335 m. asl), the "Lohrberg" (455 m. asl), the "Löwenburg" (454 m. asl) and the "Oelberg" (459 m. asl).

1.2 Geology and geomorphology

A more detailed study facilitates the individualisation of the type of magmatic acitivity which has determined the forms of Siebengebirge. On the basis of my brief visit to this area, I think it tenable that the actual physiography is the direct consequence of a phase of primary extrusion (meaning by "primary" the emission of magmatic masses immediately after an explosion phase; this is shown by the thick piroclastic cover) accompanied by weak energetic revivals made evident by the magmatic differentiation (basics or acids) included in this sphere: trachyandesites; trachybasalts.

Naturally, an activity of this kind has impeded the formation of any great volcanic build up (stratovolcano) in as much as the slight movements of the explosion axis of the inferior magmatic feeding basin have determined an equal number of effusion craters, the spread of which was immediately obstructed by the rapid cooling of the expelled materials (columnar basalts). Given these factors, it would seem justifiable to exclude the hypothesis that Siebengebirge is a remnant of one big volcano, and instead to accept the theory that these volcanic morphotypes are a part of the series which includes all the forms from the diatremes to the swelling domes, thus comparing the Siebengebirge region - at least

from the morphogenetical point of view - to that of the Puys de Dôme (at least as regards the hills, even if there the phenomenon is much more pronounced) and the neighbouring region of the Eifel, which has an equal abundance of necks, even if in that region the explosion pipes are shown up and individualised by myriads of little lacustral mirrors (maaren).

The volcanic materials of late Terziary have gone through the slate and the greywackes of the Devonian period, their positioning due to the Variscia orogeny (Carboniferous) - a common occurrence in Germany. Also to be found here are sediments of continental and lagoonal (lacustral) origins of mid-Terziary. In this region we also noted mineral deposits (copper, malachite, lapislazuli, etc.) and mineral springs of an average temperature of 18°C.

1.3 Vegetation

From the point of view of its flora, the Siebengebirge region reveals the presence of three different groups of species: one of the Atlantic/sub-Atlantic type, one central-European, and one of the wholly sub-Mediterranean type.

The presence of species typical in the area of Atlantic distribution is explainable by the proximity to the area in question of the "Atlantic phytogeographic dominion". The species of a sub-Mediterranean type distribution are instead restricted to particular areas from which, when man has made new land available (by completely felling the beech forest or abandoning cultivated land) a thermophylous flora has spread out, invading especially the vegetation made up of Indio-European species.

The presence of these three species is related to a climatic situation of Atlantic/mid-European tendencies, which locally corresponds to the passage towards the more continental almost south-eastern type. This situation is made evident by the NW-SE orientation of the area.

In short, Siebengebirge is situated on the SE limit of the Atlantic district, in the transition zone to the mid-European district, or rather, it represents the extreme north-west of central-European flora and vegetation.

The vegetation is, therefore, a result not only of the altitude but also of this particular floristic-phytoclimatic complex and of a variability of the terrain. In the case of the sub-Mediterranean type flora, for instance, cliffs and scarps could have represented very real protective areas.

The plant formations of the Fagus-Quercus variety are the most widely dispersed type in the Siebengebirge. It is possible to distinguish various groups, in which species of Fagion, Quercion pubescentis-petraeae and Quercion roborisessiliflorae, of the Atlantic nature, all prevail according to altitude, exposure and slope of the site.

From the phytosociological point of view we would summon up thus:

1. Querceto-Fagetum melicetosum uniflorae (Auct.?)

Cyclic association (i.e. not dependent on exposure or substratum and situated at different altitudes). Both Atlantic/sub-Atlantic (<u>Ilex</u>) and thermophylous species are present. The oak can constitute facies in more exposed areas. The acidphylous species that belong to the <u>Quercion roboris sessiliflorae</u> are rare.

2. Querceto-Fagetum luzuletosum nemorosae (Auct.?)

Cyclic association on the more acid soils in comparison to the preceding one. Thicker tree cover, the association cannot yet be ascribed to the <u>Fagion</u> but to the <u>Quercion</u>. Both birch and sub-Mediterranean species can be found.

3. Fagetum festucaetosum sylvaticae (Auct.?)

Acyclic association, typical of the northern slopes and usually to be found on tuffs, basaltic tuffs, and trachytic tuffs. The beech and therefore the species of the <u>Fagion</u> dominate.

4. Spruce forests: Sambucus racemosa and Dryopteris dilata facies

These are mainly spruce woods situated in the area of a decreasing Festuca sylvatica beech wood. The spruce is ousting the beech: even the undergrowth reveals its belonging to a stage in the dynamic of the beech wood. The action of man is obviously favouring spruce diffusion, but it is not certain if this is an indirectly favoured re-expansion by some protective areas, or a very real old anthropic introduction. The association is acyclic, and typical of the wet zones of sub-mountainous/mountain type and it has developed into mixed woods of beech and Acer pseudoplatanus. In the clearings, in fact, the Atropion is well represented, a typical alliance of the dynamic of the beech wood.

5. Querceto-Fagetum impatientetosum parviflorae (Auct.?)

Typical association of the sub-mountain zone on very gentle slopes (1° to 2°). It is to be found on tuffs at the limit of the Loess area. It grows on the brown soils as does the Querceto-Carpinetum. The arboreous layer is comprised of Quercus and to a minor degree Fagus. Even here the spruce appears while the Betula and Carpinus are rare. Re-occurring on the deep and humid soils are species of the Alneto-Ulmion. Also present are species of the Carpinion (Vinca minor, Galium sylvaticum, Poa nemoralis). This is a variation of the Querceto-Carpinetum with Melica uniflora of the lower mountain plain.

6. Quercetum medioeuropaeum (Br. BI. 1926)

(Luzulo Quercetum silenetosum Gavac e Krause)

The most typical formation of central Europe (sometimes also called the Quercetum-Betuletum) on upper hill slopes. In the Siebengebirge it penetrates even into the sub-mountain plain. In the arboreous layer the Quercus sessiliflora dominates. The Betula and Sarothamnus scoparius are present with Calluna facies: these denote the Atlantic influence on this aspect of central European vegetation. Also re-occurring are different and characteristic species of the Quercion roboris-sessiliflorae, acidophylous and Atlantic (Schmid's Atlantic belt), as well as south to central European and west Asiatic species. A third of the species belong instead to the southern oceanic anfiboreous group.

7. Querceto-Carpinetum torminaletosum (Auct.?)

(Luzulo Quercetum typicum Glavac e Krause)

This constitutes the last example of the Mediterranean Quercion pubescentis in central Europe. It grows in more or less normal conditions because it is typical of inaccessible areas: its growth is, in fact, restricted either to exposed areas, steep slopes, or on the basic substratum. The species of the Fagion are rare, but species of the Carpinetum (Tilia, Fraxinus, Prunus avium) and sub-Mediterranean species of the Querceto - Lithospermetum, that is of the Quercion pubescentis (Ligustrum vulgare, Prunus mahaleb, Amelanchier vulgaris) are present. Under the thin arboreous cover, remain of crasslands and sub-Atlantic/Mediterranean species also appear.

8. Cotoneastro-Amelanchieretum (Glavac et Krause)

Here it is an original, pure, climatic, thermophylous example present on exposed cliff faces to the south. Following contact with the Quercetum medioeuropaeum a thermophylous vegetation could take place with Quercus and sub-Mediterranean

species. A series of oak woods completely lacking, or with very few, beech trees runs between this vegetation and that of the central European beech wood that dominates the Siebengebirge area. These oak woods are well represented further eastwards, nearer the influence of the east continental climate.

1.4 The fauna

If a simple visit of two days can be enough for a general evaluation of the morphological, geological, and vegetation aspects of the environment, an evaluation of the fauna in a space of 4,200 hectares is a much more complex task. applies particularly to the avifauna, which would need to be observed at least once a year. From Dr. Offner's report, it can be seen that there are deer in the southern part of the Siebengebirge, where they are apt to move from one area to Before and after the second world war, fallow-deer were introduced to the area, but it was soon seen to be a species not very adaptable to this environment. prevalent animals in the area are roe-bucks and some wild The deer, fallow-deer and wild boar are kept in a reserved area of about 100 ha., close to Ittenbach, where they can be observed (from a hidden spot) especially at feeding times. The minor fauna consists of hares, pheasants, procyons, badgers, foxes etc. These last two animals were, and probably still are, subject to pitiless hunting; in Dr. Offner's report one reads "because of the damage they do". The burrows have even at times been smoked out. This is the same argument that one hears in all countries with regard to so-called "harmful animals", but it is not acceptable, especially when applied to a nature reserve. The elimination of animal predators removes a very important link in the food chains which are the basis of the biological balance of any I cannot see the difference, in ecological terms, (it should not be forgotten that we are speaking of a nature reserve declared a national park in 1960), between the protection by law of all birds of prey but not of animals. In the Siebengebirge total protection should be strongly recommended. Not only should any form of hunting be forbidden (such as that of the roe-buck, even it it is practised "by special invitation" or by "trustworthy hunters") but all the hunting towers which are now in existence should be torn down, since their presence is not compatible with a nature reserve.

The studies of Prof. Dr. Engländer on the bat of the Ofenkaulen merit a special note. Their gradually decreasing numbers over the past twenty years, seems to justify absolutely the interest in and the intensive protection of these mammals.

The temperature and constant humidity of this complex system of artificial galleries dug into the trachytic tuff offer in fact a very secure winter shelter for numerous species:

Rhinolophus ferrum-equinim, Myotis myotis, M. bechstein,
M. nattereri, M. mystacinus, M. daubentoni, M. dasycneme,
Plecotus aureus, Barbastella barbastellus.

I would recommend the integral protection of the gallery and entrance systems and the introduction of illustrative notice boards.

2. GENERAL ASPECTS

2.1 Scientific aspects

Numerous publications deal with the different sciences: geology, paleontology, botany, zoology (see the literature listed in the application). The scientific side of this reserve is especially characterised by its geological and vegetation aspects: in a geological aspect because of the clear and tangible possibility of observing each phase of the magmatism dynamic not only in the sense of the forms' origin, but also in the sense of the chemism differentiation (Weilberg and Stenselberg quarries). From the point of view of vegetation, the aspects which seem to us to be of particular importance are all those of thermophylous forest and shrub vegetation, which not only represent the most northerly examples in Europe, but also, in all probability, represent scraps of climatic vegetation. Kümmel's report (1956) on the area is a source of detailed and very precious information; the work of Glavac e Krause (1969) is also excellent.

2.2 Cultural aspects

The natural landscape of Slebengebirge has an indisputable cultural value; looking after and protecting nature is not just simply a refined activity but more the result of an inborn instinct of all Germans at every level. If the geological, geomorphological and vegetation characteristics were illustrated as they are at Weilberg, a scientific, educational plan suitable for pupils from the very first school years could be carried On the other hand, the clear setting-out of basaltic rocks in columnary structures, the presence of aureoles in layers of trachytic tuffs (caused by contact metamorphosism) demonstrate most clearly not only the eruptive but also the main morphotype dynamism of this region. I would also say that the same vegetation conditions, not absolutely perfect for a reserve or nature park in many areas, present an extremely interesting cultural aspect if considered for a modern reconstructive dynamic, either by being left to grow freely

or by being intelligently controlled by man (re-afforestation, mixed hard and soft woods). The variability of the associations, with the changes of exposure, facilitates, in a small space, close observation of the natural balances. Also to be praised is the institution, for teaching purposes, of the arboretum of indigenous species.

It would be very useful if notice-boards were located on the Drachenfels, showing the significance of the sanidinic trachytes whose crystals, orientated on the major parallel axes, indicate the direction flow of the magma, together with illustrations of the relationships between the volcanic region of Siebengebirge, the Rhine valley and the nearby Eifel region.

More difficult, to my mind, is any kind of discourse on the fauna. For a start, the reserved area of approximately 100 ha. on the right hand side of the Cologne autoway permits, the observation of deer, fallow-deer and wild boar from a hide. It is highly recommended that in this reserve hunting towers (even if they are not used) and other anomalies of this kind be torn down, since their presence near the feeding places certainly has no cultural value. The Lohrberg enclosure could be very well used for teaching purposes. Here in 3 ha. of land, deer and fallow-deer run wild. The preservation of old trees also becomes a significant factor when considered in relation to the fauna that they can shelter.

2.3 Landscape aspects

These aspects constitute the focal point of this report. It seems to me, in fact, that the natural characteristics of the area are of a typical landscape which is of interest to the whole of Europe, more by its general appearance than by the single elements which constitute its formation. Even though the Siebengebirge hills are of modest elevation, they mark in the flat low valley of the Rhine the end of the smooth northern plains of Germany, and for this reason are the setting of a very intensive tourist activity. Yet more than this, they differ from the rest of the Rhine valley as a compact unity in the landscape, the last natural barrier to the industrial plains of the north. The evaluation of a landscape is always very difficult and very often subjective if, by landscape, we mean that which has been commended by artists since 1600, i.e. the pure aesthetic or artistic value of a large or small panorama.

But the conservation of nature today has risen to the level of a science in itself, and as such cannot be restricted to simple acothetia values. On the contrary, it must avail itself of scientific considerations, of synthesis of a whole series of lithological, tectonical, physiographical, climatical,

biological and anthropical factors. Naturally, it is understood that in the anthropical factors are included all the modifications which, introduced after the exploitation of the area, have modified the original characteristics, but which by now have become an integral part of the actual landscape.

Thus the Siebengebirge constitutes a well-marked and easily defined land system, especially on a geological and geomorphological basis, which is, as I have mentioned, very different from the rest of the Rhine land system. Separately, but more often together, these constitute a landscape of indisputable aesthetic value.

2.4 Recreational aspects - tourism

Enjoyment of the woods, the verdure, the air, in fact. of all nature, is the greatest recreational attraction offered throughout the whole of Siebengebirge. The conception of the reserve was as an area to be put completely at the public's disposal with the provision of a complicated network of footpaths, refreshment rooms on the tops of hills (e.g. Drachenfels and Oelberg) or in the valleys (e.g. Margaretenhof); and of transport facilities (cable-car or animals) for certain steep slopes (Drachenfels). But the greater part of the reserve is set aside for the enjoyment of nature and green spaces, an aspect which often coincides with the cultural needs of those wishing to observe forest formations (soft and hard woods), flowers, birds, forest animals, etc. The reserve of fallowdeer, deer and wild boar in the Ittenbach region represents an attraction of notable recreational interest. The Siebengebirge park welcomes a large number of visitors: more than 3 million each year. So many visitors in an area of 4,200 ha. must have many facilities at their disposal, and organised recreational equipment. The VVS has supplied us with the complete list of equipment, which I consider worth reporting:

- 1. About 200 km of beaten pathways, of which 100 km is used as road and about 50 km for moving wood. 50 km thus remain, which include 9 wooden bridges;
- 2. 17 car parks, comprising a total of 4.25 ha;
- 3. 28 picnic areas and playing fields, covering a total area of 17.5 ha.;
- 4. 392 single seats;
- 5. 45 groups of seats comprising a total of 132 individual seats and 13 benches;
- 6. 325 beds:
- 7. 28 shelters;

- 8. 8 notice boards with maps and information for the public;
- 9. About 200 signposts;
- 10. 6 lakes covering a total area of 1.25 ha.:
- 11. An arboretum of 0.6 ha. for teaching purposes:
- 12. A game enclosure of 100 ha.;
- 13. Lohrberg deer and fallow-deer enclosure (3 ha.);
- 14. The Weilberg and Stenwelberg quarries places of scientific interest;
- 15. A network of pathways the whole length of the forest (in construction).

The increase of parking space and footpaths in the forest has already been included in the next recreational development five year plan. So many visitors, no matter how tidy and well-behaved, concentrated in 4,200 ha., will always finish by causing deterioration of the environment. Moreover, if recreational equipment is not restricted to the external limits of the reserve, the entire forest runs the risk of becoming an immense wooded park. It will be necessary to keep this in mind at the next VVS planning meeting. Up till now, all projected equipment has been constructed in an exemplary manner, harmonising perfectly with the natural landscape.

3. LANDED PROPERTY

The reserve consists of 4,200 ha., of which the forestry part is divided as follows:

State forests	- 1,517 hectares
VVS forests	- 803 ^{ti}
Forests of the borough of Bad Honnef	- 723 "
Forests in borough ownership	- 307
Private forests (more than 1,100 private owners)	- 540 "
TOTAL	3,890

The remainder of the privately owned area is used mainly for agriculture.

The actual policy of the State Forestry Service and the VVS is favourable to the private purchase of land (34 ha. have been bought in the last five years).

4. ADMINISTRATION

The authority responsible for the park is the VVS, which superintends all its activities, as well as those of the Regierungsbezirk park of Cologne. This association for the conservation and the protection of Siebengebirge was set up 100 years ago. Not only do its responsibilities cover the naturalistic, but also the recreational and organisational aspects of the park. This body, therefore, looks after maintenance in general, construction of roads and pathways, refreshment rooms, shelters, car parks, etc. Funds collected are used exclusively for these purposes.

5. SYSTEM OF PROTECTION

Siebengebirge was, on 17 June 1922, the first region in Germany to be declared a "nature park".

Since then, during the passage of time, numerous other laws and decrees have been passed (26 June 1935, RGBI, I, p.821; 20 January 1938, RGBI, p. 36; 31 October 1935, RGBI, I, p.1275; 16 September 1938, RGBI, I, p. 1184; 16 October 1956), the most recent of which are dated 22 March 1965, and 9 September 1968. In the decree of 22 March 1965, it is worth pointing out that Article 4, point 1, states: "normal and suitable forestry will continue to be permitted, provided the beauty of the original landscape is given priority over financial gain". "... the original Rhine character of the caducous leaf woods must be conserved for at least three quarters of the growth ..." and again, Article 5 "... legal hunting and fishing are permitted".

A better version is to be read in the decree of 9 September 1968, in which forestry must be carried out "in an almost imperceptible manner". It also foresees the institution of "permanent forests absolutely free from every kind of sylviculture".

With regard to forestry, we must recommend that it be carried out only for nature conservation, or for the improvement or reconstruction of the natural environment originating from the forests of the Rhine valley. On the other hand, the almost total lack of profit derived from tree

felling (the poor quality of the wood, damaged during the second world war), should also, in an economic sense, justify A fair policy of compensation could be such a rule. envisaged for the future. But a naturalistic sylviculture must, in a national park (declaration of 1960) bear in mind all the original species. It must first be remembered that many countries, far from declaring a war to the death against the coniferae, prefer to plant such species, either for aesthetic reasons (disputable) or for practical reasons, or simply because the belief that every form of re-afforestation is based on coniferae is firmly rooted in the minds of It was therefore with some satisfaction that I foresters. saw at Siebengebirge some (very successful) attempts at reafforestation of mixed scft and hard woods, and that the State gives grants for the reconstruction of deciduous The next logical step would be to eliminate the coniferae, to make room for the original species a certain number of years after the initial implantation.

Naturalistic sylviculture also means the elimination, even if very gradually, of adventitious non-autochthonous species (e.g. Robinia pseudoacacia, Larix, etc.). Their presence is not admissible in a nature reserve, whose aims are both cultural and scientific.

In the decree of 9 September 1968, no mention was made of hunting and fishing - which are still permitted, in spite of the limitations imposed by federal law and the park's administrative body (see the paragraph on fauna).

It would be desirable for the highest nature conservation authority (the President of the Regierungsbezirk park) to pass a new decree restricting forestry to purely naturalistic activity, and abolishing hunting and fishing in the Siebengebirge park.

5.1 Type of protection

For the purposes of the reserve, the greater part of it may be compared to the pre-park C zone of a modern national park, and a smaller area to a B zone of guided protection. In other words, all considerations are based on its usefulness to the public in the light of its various cultural, aesthetic and recreational possibilities.

The type of protection, on the other hand, is strict and severe. The landscape and natural characteristics of Siebengebirge are well looked after under every aspect (see Article 3 in the decree of 22 March 1965 mentioned in the application).

5.2 Supervision and control

The supervision of the park is in the hands of six foresters, three of whom belong to the State Forestry Corps, two to the VVS and one to the borough of Bad Monnef. There is wide co-operation with the police authorities of the city and of the surrounding villages, as well as with the tourist associations.

6. ROAD CONDITIONS

Four asphalt roads cross the reserve. There are also about 200 km of beaten paths, of which 100 km is used as roads. All the roads entering the park, beginning with the main tangential or crossing ones, are closed to cars. These may be left in a network of car parks covering a total area of 4.25 ha. - we find this space insufficient. In the five year development plan, another six parking lots are envisaged besides the enlargement of the existing ten.

Approaching the park is quite simple and rapid, as there is a good tangential network of roads. Two main roads border the reserve: to the west the EB 42 and to the east the Frankfurt-Cologne motorway. There is also the railway, which follows the Rhine valley from Cologne and Bonn.

7. NEXT FIVE YEAR PLAN

Numerous projects are planned for the next five years; the following is taken from the "North Rhine-Westphalia 1975 programme":

- 1. Enlargement of 10 parking lots and construction of 6 new ones.
- 2. Opening of pathways to cover a total of 100 km.
- Construction of 4 horse-riding tracks one larger than the others, to be counted separately from the pathways.
- 4. Picnic areas and playing fields.
- 5. 6 playing fields for children.
- 6. Construction of 10 observation sites.
- 7. Historical/cultural zone furnished with illustrative notice boards.
- 8. Extension of the arboretum.

- 9. Shelters (15), seats (200), beds (300).
- 10. Lakes and other aquatic areas with access path-
- 11. Fountains (15).
- 12. Purchase of the Dornheck, Blauen and Märchen lakes in the Ennert forest.
- 13. 60 big information notice-boards, 300 small information boards, signposts.
- 14. Construction of a big riding track on the outskirts of the park.
- 15. Construction of an information centre near the Brachenburg Castle, and of a forestry museum.

The cost of these works is very high and estimated at about 10,025,000 DM, besides maintenance costs.

It would, perhaps, be useful if the Commission indicated the priorities by a points system (i.e. 1-2-3-4-5-6-7-8-9-13).

However, it must be understood that such development in recreational equipment should be kept to the outskirts and not affect the interior of the Siebengebirge.

8. RECOMMENDATIONS

The European Committee for the Conservation of Nature and Natural Resources should highly recommend the following points:

- 2. The setting up of a system of scientific-illustrative notice-boards in the reserve or at the entrances in the villages.
- 7. Opening up of the stretch from the Drachenfels to the Sanidinic trachytes.
- 3. Banning of all forms of hunting in the reserve and, in particular, that of the so-called "animal predators".
- 8. Continued protection of the most northern vineyards in Europe.

- 4. Reduction and regulation of the forestry, to be carried out exclusively in the interests of the woods and landscape.
- 5. Elimination of the adventitious species.
- 1. Provision of maps showing vegetation, geology, routes, roads and location of fauna, posters denoting the park rules, etc. for the use of the public.
- 6. Development of recreation equipment outside the park wherever possible.

9. CONCLUSIONS

Given the natural and organisational characteristics of the Siebengebirge park as set out in the preceding pages;

considering that throughout the world it is necessary to ensure the protection, conservation and appreciation by man of still greater areas of land, representing the various natural environments present in each country;

believing that this will become ever more important, given the increase in industrialisation and demographic expansion;

I feel that the application of the VVS for the European diploma is worthy of serious consideration.

I would strongly recommend that the European diploma be awarded, to the Siebengebirge nature reserve in the category of "protected landscape".