1 GEOPHYSICAL PROSPECTING

Since our field work of the largest scale is mainly of methodological character (geophysical prospecting of the *Nyír* region for hydrocarbons), its description can be found in Chapter 2.

The rest of our prospecting work is mainly connected to solid minerals, water, and engineering problems. The activity can be classified according to regions.

In the *Transdanubian Central Range* the minerals investigated are bauxite and lignite. The geological model is, usually, a Mesozoic carbonate basin floor directly overlain by the bauxite deposits of *carst* type, and by the lignite seams of basal type. The covering complex is a variable Tertiary sequence, but no matter how variable it is, its composition is mainly clastic sedimentary, its thickness does not (must not) exceed 3–400 m, and all of its physical parameters are lower than those of the basin floor.

Hence, gravimetric reconnaissance, different geoelectric methods (VES, PM, etc.) and seismic refraction are comprised in those integrate surveys which are detailed in the Hungarian text (Figs. 2–7).

The sulphidic ore prospects are connected with the Tertiary volcanic mountains of North Hungary. Structurally, these volcanic mountains are of basin character, no matter how rugged topography they have and in what an altitude. The general pattern is a Mesozoic carbonate or a Paleozoic (mainly) crystalline basin floor (the latter is identical with the basement) or both, under a sandwich of Tertiary sediments, pyroclastics and/or lavas of rather neutral composition. The thickness of the covering complex ranges from 100 to 2000 m.

The material of the basin floor is of secondary importance in judging its ore prospects, although a carbonate type is somewhat more favourable for a metasomatic mineralization in the deep level. Its structure, however, deserves serious attention for the dykes are regarded as ascension channels for the ore-bearing solutions which may have affected the basin floor and the topmost horizons of the pyroclastics of the stratovolcanoes as well.

Accordingly, the prospectings are going on in two scales. The one is designed both methodologically and dimensionally for tracing the morphology (which is of tectonic origin) and – possibly – the material composition of the basin floor. It can be regarded as an independent survey inasmuch as the deep mineralization is considered. It is, however, at the same time the preliminary reconnaissance survey for the detailed ore prospecting in the higher levels.

The first stage of the survey is carried out by gravity, VES and seismic refraction (exceptionally and experimentally: with CDP reflection) measurements.

In the second stage micro-gravimetric, detailed magnetic, VES and, mainly, induced potencial methods acquire importance.

Two regions carry sulphidic ore prospects; accordingly, two themes of ours have been dealing with these problems: *The investigation of the structure and metallogeny of the Börzsöny Mts.* and *An integrate survey in and around the Mátra Mts.*, both described and illustrated in details in the Hungarian text (Figs. 8–17).

The water prospecting is both thematically and organizationally separated in ELGI.

The *deep water prospecting* means location of optimum sites for drillings tapping cold fresh water from Pliocene aquifers (for drinking and irrigation) hot fresh or mineral water from Lower Pliocene beds, and usually hot fresh carst-water from a carbonate type basin floor (for industry, hot-house farming, balneology). The depth range of these investigations is 500–1500 m. A considerable saving of drilling costs can be attained by applying a preliminary geophysical survey (Figs. 22, 23). The methods applied are practically the same as in CH prospecting.

The *shallow water prospecting* means a search for ground water table, gravel beds, buried terraces and old river beds (bed rocks). The final aim is setting up of water works of different size, but as a matter of fact, the direct utilizers are the test drillings again. The main methods are geoelectric ones.

The tasks in the line of *engineering geophysics* are very variegated: dam site investigations, railway tunnel planning, quarry openings, regional development projects (Fig. 18), soil conductivity tests for broadcasting stations (Fig. 24), etc. The methods applied are mainly geoelectric ones, here and there with some shallow refraction work.

An important field activity of ELGI – apart from the crustal investigations (reported in Chapter 3) – is a seismic reflection work with an apparently theoretical, purely scientific aim: *The methodological research of the foregrounds of the Hungarian Central Range.* It is methodological in a sense that it intends to penetrate below the basin floor (hitherto impenetrable) by digital seismic measurements and manyfold stacks (Figs. 19–21). The theoretical character of this research lies in the fact that the peculiar structure of the Carpathian basin is, in fact, unravelled up to this day and, accordingly, it is a matter of disputes. This research, nevertheless, has economic implications for one need not say that tectonics and the accumulation of several deposits are in close connection.

All these investigations are detailed and illustrated in the Hungarian text (1 Fejezet = Chapter 1), and they are accessible in our *Archives.*