though they seem to be mutually parallel, in reality intersect one another at very acute angles, thus constituting a highly elongated network. The dykes are not alike. Most of them may be considered aphanitic or dioritic; one, however, is quartz porphyry, with dihexahedra of quartz of pea-size.

The principal deposit is the so-called Reichenstein stock, which had been worked, during the period prior to my visit, to a depth of about 1,300ft. from its outcrop, 1,120ft. above the deepest adit, to a level 240ft. below the adit. Fig. 65 shows the form of the ore-channel on the strike. The horizontal section of the body was most frequently circular or elliptical. In some places one dimension strongly predominated, so as to give the appearance of a fissure-filling. At the outcrop, according to the old maps, there was but one channel; below, this divided into neighbouring and mutually connected branches. Several of these might continue parallel and independent for considerable distances. The total sectional area of these channels averaged perhaps 215 to 322 square feet, but at some levels the deposit was only present in traces, whereas at others it had many times its average section. Fig. 66 shows, by the difference between the plumb-line and the arrow, the angle between the true dip and the pitch of the ore-body oblique to it.

The ores were doubtless sulphides originally, but were afterwards oxidized in places. Rich silver-ores predominated, especially argentite, pieces of which weighing several pounds appear to have been no rarity. Besides this mineral there were hessite (telluride of silver), tetrahedrite, redruthite, galena, bismuthinite, and various pyrites. Taking these together with the oxidized ores the deposit represented a whole mineral cabinet. The maximum silver-value was reported as 12 to 20 kilogrammes per 1,000 (1·2 to 2 per cent.), the gold being 3 grammes to each kilogramme of silver. The percentage of lead was about twenty times, and that of copper about ten times, as great as of silver. The metric ton (2,206lb.) would yield, at this rate, 24 to 40 per cent. of lead, 12 to 20 per cent. of copper, 386oz. to 643oz. troy of silver, and 1·15oz. to 1·83oz. troy of gold.

As regarded the origin of the cavity, my views were influenced by the numerous caves of the region. The mines repeatedly reached caves into which the mine-water could be discharged without filling them, there being some subterranean outlet. But these caves were formed by descending liquids of the vadose circulation; and to assume a similar origin for the cavities filled by the ore-bodies would be to assume that the latter cavities were formed in a manner directly opposite to that in which they were filled, which is highly improbable.

It was not until becoming acquainted with the observations of J. Nöggerath on the thermal springs of Burtscheid that my views were modified by his being able to show that ascending mineral springs are able to cut their own way to the surface, forming the channels which they ultimately fill with ore. The most difficult feature of all—namely, the nearly cylindrical form of the ore-bodies of Valle Sacca—was thus satisfactorily explained.

The channel of the Reichenstein body runs vertically for 1,312ft. in limestone between greenstone dykes; or, in other words, in a zone of lime between two zones of impermeable rock. The dykes therefore control its direction. It follows downward nearly at the angle of their steepest dip, but with a pitch southward, giving it a "false dip."

The sections of the various workings show that the ore-body apparently ended at one side of the dyke, and recommenced at the other side, as if it had passed through. In that case, porous places in the dyke-mass at the intersection will have determined the track of the channel. It is significant that the Reichenstein ore-channel passes in depth through the dykes to the south-west towards what is probably a great fault-fissure, and not in the direction of the present drainage. Nor could the former deep drainage from this channel have been to the north-east, along the contact between the limestone and the underlying Liassic sandstone (which, in fact, appears at a lower level, where the Valle Sacca joins the Galbina Valley), for the reason that all the barriers of the greenstone dykes, unquestionably extending from the limestone into the sandstone, would have opposed that flow. The stratigraphical conditions thus exclude the possibility that this channel was formed by vadose circulation, and render more probable the view that it owes its origin to the ascending waters of the deep circulation, which certainly effected the filling of it.

Raibl.—Raibl, in Carinthia, is the best representative of a group of deposits which were at a recent period taken to be genuine beds even by V. M. Lipold, then the best authority on the mines of the Alps in general. Here and there, as, for instance, by A. Morlet, observations were made which threw some doubt on this conception; but since they did not fit into the prevailing system they remained disregarded. It was my fortune to establish the truth of the situation. Professor von Groddeck kindly characterized my investigation of it as "opening a new path," and adopted the filling of spaces of dissolution as a class in his system.

Such deposits occur in Carinthia, in an E. to W. limestone alpine range, of which Raibl is the western end; and also somewhat further north, in the zone of Bleiberg, near Villach, chiefly in a limestone, early denominated for this reason the ore-bearing limestone, and more recently determined as Triassic.

The ores occurred mostly in the vicinity of certain intercalated slates, which seemed always to occupy the same "Raibl horizon," and thus led to the conclusion that the ore-deposits (naturally believed to be of contemporaneous origin) likewise occupied a fixed horizon. But it soon appeared that the slate at Bleiberg belonged to a somewhat different horizon in the Trias, which showed that the impermeability of the slates, as compared with the solubility of the limestone, had had something to do with the ore-deposition, which was a secondary formation in the rocks.

There are found at Raibl, some distance below the slates, in the limestone which conformably underlies them, what seem indeed at first glance to be beds of ore. They consist chiefly of a coarsely crystalline galena, with pyrites, and a zinc-blende (wurtzite) in very thin crusts, hence called *schalenblende*. A closer study, however, of the extremely distinct crustification reveals that it does not represent the stratification, which, on the contrary, it crosses at all angles, being, in fact, the filling of irregular spaces traversing the limestone in every direction.