Adolf Schmid (1802 - 1863)
the father of modern speleology?

by

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The two men who have had the greatest influence on the development of speleology as a whole were A. Adolf Schmid and B. A. Marot. Admittedly much good work had been done before their time in the form of difficult explorations, regional studies, explorations of speleothem formation, theories of speleogenesis, etc., but no one had previously brought together more than a few aspects of the science now called speleology.

Schmid, and later Marot, made a conscious effort to bring the various branches of cave study together, both in research and in publication, and it is significant that all the word used to denote the subject as a whole were introduced in their time. The earliest word for this purpose in any language was Höhlenforschung, meaning cave study. It was introduced by Schmid (1826, p. 364) in a paper read to a learned society in Vienna on 5 December 1850, and subsequently the word Höhlenforschung was used for the exploration of caves. Both are still in current use in the German language. The more universally used term speleology, with its variants, is said to have been created by Emile Rivière, the prehistorian, about 1890 (Marot, 1931, p. 11). Its general adoption began when it was taken up by Marot.

A. Adolf Schmid was born on 18 May 1802 at Königswart in Bohemia. He studied philosophy and law in Vienna from 1819 to 1825, where he later obtained his doctorate, and then he took up teaching. After a period as a school teacher in Vienna he became tutor in the family of Prince Ferdinand Lobkowicz. His inclinations at that time were already towards science, and in 1831 his first book appeared, a topographical study of the Schneeberg, to be followed by at least 27 other (topographical) books besides his cave publications. From 1844 to 1847 he edited the Österreichische Blätter für Literatur und Kunst and then between 1847 and 1857 he was principal registrar of the new-
ly founded Kaiserliche Akademie der Wissenschaften (Imperial Academy of Sciences) in Vienna. It was during this relatively short period that almost the whole of his cave work was done. His removal to Budapest in 1857 when he was appointed professor of geography and history at the polytechnic there seemed to bring it more or less to an end. He remained in Budapest until his death on 20 November 1865 (Amon, 1888; Astone, 1861; Schmidt, 1865; Warnebach 1865; S., 1890; Poggenpoll, 1896; Meister, 1947; Retzov a et al., 1960, 1967. The little portrait reproduced here is from an obituary, (Schmidt, 1869).

Nearly all Schmidt's cave explorations took place in Slovenia, Austria and Hungary. In 1839 he set out with the avowed intention of "establishing the exact topography of the caves of Slovenia (47, p. vi), exploring and recording meticulously and having accurate surveys made by his companion Ivan Rudor. It is particularly significant that this was not done just in order to extend the tourist caves. His accounts of the several caves of the Postojna system, and of Predjama Jama, Skocjanskaja, Križna Jama and other caves provided the first exact descriptions of them.

In Postojna, itself, his major achievement was the discovery of nearly half a kilometer more of the underground river Pivka. He reached its hidden course just downstream of the Velika Dočna, near the mouth of the the Pivka had found open in 1774 but by another route which opposed it, as we, the exploration required very dry conditions for the two intermediate sumps to be possible. He pushed ahead for a distance of 570 m, the first part of which Hamburger had already visited, and not far from the Studočka Loke (47, p. 47, 146 & plate 2). On this occasion Schmidt was accompanied by his son Ferdinand.

They set off, with a boat, on 30 August 1839 and continued all night. The danger was the race at which the Pivka rises after a storm, sealing the stumps and blocking the way. Such a storm did break over the area that afternoon and eight hours later (01.14 AM) the next morning, the level was up by 3 m, effectively ending off their return for a while.

Supposedly Postojna, at least for the present, Schmidt turned to the Pivka's resurgence and investigated the Plutar case in 1852 (47, p. 127-151). According to Rudorff's plan (47, 2, plate 10) they explored a total distance of 800 m (these 475 m up to the junction, plus 285 m in the south branch and 268 m in the other). They used a specially made wooden canoe which could be taken to pieces for ease of carrying in small passages. In the western branch of the cave the canoe had to be unloaded and dragged through the shallow water no less than eleven times, as well as being dismantled altogether at one point. The south branch was generally easier to navigate, although there were rapids in one place; in another spot the boat had to be taken to pieces where the water disappeared beneath boulders, and reassembled beyond it.
They also broke new ground in other caves of the same system, between Planina and Postojna. Schmidl's records of the water temperature, taken at many points primarily in connection with studies on the blind amphibian Protes buziusius, also aided his deductions regarding the interconnection of the various caves. In the Crna jama they followed in Nagel's footsteps and then found about 250 m of new passage in its north-east corner. The next opening to the north of Crna jama is the 65 m deep Pirkova jama, and, in August 1852, Schmidl and Rudolf were the first to explore it. They found and surveyed 90 m of new passage in and added some relatively minor extensions in the autumn of the following year (47, p. 106-113, 301-302).

Schmidl's equally significant though much less lengthy discoveries in Skocjanja jama took place in the spring of 1851. It is in this cave that the river Ikota or Timavo sinks. Its underground course of some 33 km passes behind Friul and had already attracted attention as a possible source of water supply for that city. He spent six weeks investigating the hydrology of the whole system. In Skocjanja jama he and Rudolf, together with Domenico Botterlin a Trieste freeman, succeeded in reaching the sixth stratum, some 400 m from the entrance. This was not in fact very much farther than the Italian had gone by boat in 1843, but their method of approach provided the key to the successful expeditions of the 1840s and 1850s. They realized that it was impossible to follow the bed of the stream itself very far and came to the conclusion that they could only progress if they could find a ledge along one of the walls. This became possible when Schmidl discovered what is now called the Schmidlova jama, on the west side of the doline at Skocjan. It was an earlier channel of the river, at a higher level, and gave access to ledges some 90 m up the wall of the present river cave (134).

Closer to Trieste itself the underground river had been reached in 1841 by Linke in the Crotto di Tristano, but it the level could not be ascertained, this was not clear whether or not Schmidl discovered it himself, but at any rate he used data on the water level there. By studying this level, together with that of the sink and the risings, he obtained the gradient for the underground river, which seemed reasonable, and he also recorded the water temperature and the speed of flow (the lower velocity, not the volumetric flow) in aid in assessing its suitability as a water supply.

After 1854 he made only one small but important discovery in Slovenia. As late as 1856 in Pecjulica he constructed the two halves of the Male Jama passage, which had formerly consisted of a few calcite shafts. What he did was to unlock a 15 m long collapsed section of passage after the survey had indicated the existence of martel (149, p. 439-451).

In 1855 Schmidl turned his attention to Austria. In particular he explored the
Geologich in 1851 and published a plan (54) which showed very little more than Strelin had reached in 1857. He did not reach the shafts which are now known to attain a depth of 332 m, for the passage leading in that direction was
thought to be inaccessible even on all fours. His published account is very detailed and pays particular attention to temperatures and to barometric pressures as a means of determining altitudes in the cave. It was in the same paper that he drew attention for the first time to Strem's 16th century exploration of the cave, and printed Strem's manuscript in its entirety.

In August of the following year he made a thorough investigation of the Aggtelek Cave in Hungary which, with its length of 8,667 km, remained the longest cave in Europe until 1893 when new discoveries at Postojna brought the letter to 10 km ([49], p. 397-508). Once again he included tables of temperature readings and also a note on cave fauna.

The value of Schmidt’s work is greatly enhanced by the surveys made by his colleague Ivan Rudolf who probably accompanied him on most of his explorations. Rudolf was born near Záprask in 1821 and became an engineer, first at the mercury mines there and then at Rábej. His name is commemorated in the Rudolf Chamber at Slojkovská Jama and Rudolf’s Passage in Plánina. The published surveys ([47], 2, plates 7, 10) show 850 m in Postojnska Jama, 6000 m in Plánina, 493 m in Crna Jama (with he initially Magdalena Cave as Napoli and others have done before), and 1986 m in Predjamska Jama. The Postojna plan was also printed again at a smaller scale, superimposed in colour on a relief map of the ground above so as to relate the caves to the surface topography (47, 2, plate 1). Many of the other caves in the district to the surface have been surveyed by Rudolf, or at least measured. For Schmidt ([47], p. 203) gave a table of length for eleven caves in all. The total passage length amounted to 19,110 m. These figures were for the caves as they were known at the end of 1832, and several of them were enlarged later by subsequent discoveries.

Schmidt’s concern with underground hydrology as a useful product of cave exploration has already been mentioned in the case of the Timavo water sinking at Slojkovská Jama. He was interested too in the origins of the two streams which emerge underground in the Plánina cave, though here he was only partly correct. A proportion of the underground water from the Crkvenica lake and the river Rok flow directly to the eastern source of the Timavo (the river which rises principally at Plánina) without appearing in the Plánina cave at all. Schmidt ([47], p. 153) was the first person to appreciate this and it probably influenced him in his incorrect belief that none of the Plánina water comes from Crkvenica. In fact most of the water from here does flow, via the Rokov Most, into the Plánina cave, whence they emerge together in the western source of the Timavo. The actual junction of these two streams was known since 1748 or before but their origin remained in dispute for many years. Father Anton Urbas (1849) supposed correctly in 1848 that the south branch was fed from Crkvenica and the west one from Postojna. Schmidt ([47], on the other hand, considered that it was the
south branch which received the Pirka water, while the other one drained the Klabinfels plateau to the west.

Although Schmidl's exploration of caves and the accurate recording of their temperature are of his importance, he also had a wider interest in caves as an environment. His temperature measurements of both water and air, have been noted already. The former were largely taken for use in cave fauna studies, the latter, together with his barometric readings he used primarily for altitudes, reveal his interest in cave meteorology.

In the Postojna cave he took hourly barometer and thermometer readings inside the cave over a 24-hour period in 1852, for comparison with simultaneous readings in the market place of Postojna. The temperature of the latter varied from 9.6°C to 13.4°C, while inside it remained between 6.8°C and 7.0°C (47, p. 175). He tabulated readings of air and water temperature, humidity and barometric pressure in seven other caves in the district, comparing his own readings with those of previous workers. The Hungarian cave of Láda near Schönau attracted particular attention (49, p. 614-616).

The mechanism of cave formation evidently did not interest Schmidl a lot, but he did express an opinion on the origin of dolines. Although the majority of dolines are in fact caused by solution widening of joints in the limestone, there are in Slovenia some spectacular dolines caused predominantly by collapse into caves beneath. No doubt it was because of these impressive examples in the area he knew so well that Schmidl (47, p. 190) became convinced that all dolines were of similar origin. His writings had considerable influence and he has been credited as the founder of the collapse theory (Cvejić, 1960) although he was far from being the first to uphold it. In a later book (65, p. 29-32) he devoted some attention to speleogenesis itself.

The study of cave fauna was already a specialised subject in Schmidl's time. He undertook very little original research in it himself, though some of his water temperature measurements were made in connection with studies on Prostomum impudicus (25, p. 231). What is significant, though, is that he regarded such studies as a proper part of speleology. Thus his major book on the caves of the Postojna district includes important sections by Schmidl (354) on cave fauna and by Polaković (354) on cave flora. Zippel (1855) contributed a section on zoological and palaeontological aspects.

It is in breadth of his interests in cave studies, coupled with the extent of his documentary and technical difficulties he surmounted, that justify Schmidl's reputation as the father of modern speleology.

Schmidl's importance does not rest solely on his achievements, considerable as these were, but also on the influence he had on his successors. All his explorations were recorded in detail, with precise descriptions and accurate su-
vailing, and, as has been seen, associated scientific work was also included. Most of this material was published in scientific periodicals, accessible but not prominent. More influential was this separately published book: Die Grönten und Höhlen von Adelhöhe, Luzer, Palestine and Loka (47). The closely written text, generally descriptive, gives full summaries of previous work and a separate volume of large format contains the plans and also eleven lithographs for which Schmidt was his own artist. Clearly it was intended at the time that this book would be the first volume of several, for opposite the main title page appears a series title Zur Höhlenkunde des Karten. This intention was never realized, overaken perhaps by Schmidt's new duties in Budapest after 1857.

Martel himself speaks very highly of this book. It cannot be considered as the first of its type, and its author as the real originator of speleology or the scientific study of caves (Martel, 1894, p. 435). Again, it is written mostly, le point de départ réel de la Spéléologie (Martel, 1903-06, p. 5).

Mention of Martel brings us to the inevitable comparison between the two men whose roles were somewhat similar. In any developing science, the later worker brings it more nearly to its present state but he builds on the foundations laid by his predecessors. The earlier man, on the other hand, starts from a more primitive stage and might be expected to make more fundamental changes. Thus it is not easy to say which of the two is the more important. Some facts about the two men's work may be compared, however. Schmidt was actively involved in caves for some seven years, Martel's period of archeological exploration lasted for 26 years and he continued to study and write about them for a further 23. Schmidt's investigations were confined to fairly adjacent areas of central and southeastern Europe, whereas Martel's, which predominately in France, ranged also into all parts of Europe as well as Russia and America. Schmidt's crops published writings on caves amount to 3 books and several dozen papers, while Martel produced some 20 books and 780 papers, many of them translated and published abroad. The spalaleological society set up in Amiens in 1879 onwards may owe something to Schmidt's influence. Martel himself founded the Société de Spéléologie in 1889, which had a significant international function.

This is not to say necessarily that Martel was of more importance than Schmidt in the history of speleology. Certainly his achievements were greater but that was largely the product of the very much longer period for which he was active, combined with the fact that by then speleology already existed as a recognized and organized subject, at least in the German-speaking parts of southern and central Europe. That in itself is undoubtedly due in some measure to the influence of Schmidt's generation before.

In any case Schmidt was without question the first person to treat speleology...
as a single coherent whole - its originator as a science as well (+Höhlenkunde) as a word.

ACKNOWLEDGMENTS

In the preparation of the bibliography I have been kindly assisted by willing assistance from the British Museum (Natural History), Smithsonian Institution, and the geological society of London. I wish to express my gratitude to the various institutions and libraries for their assistance. Particularly grateful I am to the late Professor E. A. W. Bennet, who supplied me with many copies of his publications.

SUMMARY

A. Adolf Schmitz (1828-1900) and the first person in logical geology as a single coherent subject. Besides making important new contributions, he studied land morphology and underground morphology, and was also closely connected with the work of other notable Germans and Frenchmen. His publications ensured that his achievements were known to his countrymen, but his influence was felt worldwide. I am grateful to the many individuals who have contributed to this bibliography.

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