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

by T. R. Shaw

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

Schmid and later Martel, 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 work 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 recently introduced word of speleology, with its variants, is said to have been created by Emilie Rivière, the prehistorian, about 1890 (Martel, 1933, p. 11). Its general adoption began when it was taken up by Martel.

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 Lobkovicz. His inclinations at that time were already towards writing 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 at Budapest until his death on 20 November 1863 (Aston, 1888; Aston, 1861; Schmidt, 1865; Wenzelbach, 1869; S., 1890; Puggendorf, 1898; Meister, 1947; Retzower et al., 1960, 1967). The little-known 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 Rudolf. 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 Predjamska Jama, Skocjanske Jama and other caves provided the first exact descriptions of them.

In Postojnska Jama itself, his major achievement was the discovery of nearly half a kilometre more of the underground river Pivka. He reached it, his hidden course just downstream of the Velika Doberana, not by the sump that Haug had found open in 1772 but by another route which entered it. Even so, 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 Hadjek had already visited, and not far as the Spodnja Tuna (47, p. 47, 148 & plate 21). 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 route at which the Pivka river after a storm, swelling the sumps and blocking the way. Such a storm did break over the area that afternoon and eight hours later (at 1 a.m.) the next morning, the level was up by 3 m, effectively ending off their return for a while.

Stopped in Postojna Jama, at least for the present, Schmidt turned to the Pivka's resurgence and investigated the Plitvica cave (47, p. 151-152). According to Rudolf's plan (47, p. 20) they explored a total distance of 1000 m there, 1475 m up to the junction, plus 2955 m in the south branch and 2600 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 seventy 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; 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. Schmidt's records of the water temperature, taken at many points primarily in connection with studies on the blind amphibian Proteus anguinus, also added 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 opened pit to the north of Crna jama is the 65 m deep Pirkà jama and, in August 1852, Schmidt and Rudolf were the first to explore it. They found and surveyed 950 m in it and added some relatively minor extensions in the autumn of the following year (47, p. 106-113, 301-306).

Schmidt's equally significant though much less lengthy discoveries in Skocjanova jama took place in the spring of 1851. It is in this cave that the river Seča (or Timavo) sinks. Its underground course of some 35 km passes behind Trieste 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 Skocjanova jama below Trieste, with Domenico Battellini a. Trieste, he witnessed, in reaching the sixth subaerial, some 400 m from the entrance. This was not in fact very much further than Seča had got by boat in 1840, but their method of approach provided the key to the successful expeditions of the 1850's and 1860's. 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 Schmidt discovered what is now called the Skocjanova 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 on the wall of the present river cave (34).

Closer to Trieste itself the underground river had been reached in 1841 by Lindner in the Grotta di Tristano. It is not clear whether or not Schmidt descended Tristano himself, but at any rate he used data on the water level there. By subtracting this level, together with that of the sink and the spring, he obtained the gradients 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 of assessing its suitability as a water supply.

After 1854 he made only one small and important discovery in Slovenia. As late as 1856 in Postojna he reconnoitred the two halves of the Male same passage, which had formerly consisted of two cul-de-sacs. What he did was to Noblock a 15 m long collapsed section of passage after the survey had indicated the connection (Martelet. 1849, p. 439: 351).

In 1855 Schmidt turned his attention to Austria. In particular he explored the
Gedaloch in August and published a plan (54) which showed very little more than Strehl had reached in 1897. He did not reach the shafts which are now known to attain a depth of 322 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 pres-
ures as a means of determining altitudes in the cave. It was in the same paper
that he drew attention for the first time to Štefánik’s 16th-century exploration
of the cave, and printed Štefánik’s manuscript in its entirety.
In August of the following year he made a thorough investigation of the AG-
getale Cave in Hungary which, with its length of 8,667 km, remained the long-
est cave in Europe until 1893 when new discoveries at Postojna brought the
letter to 10 km (49), p. 397-408. Once again he included tables of temperature
readings and also a note on cave fauna.
The value of Schmidl’s work is greatly enhanced by the surveys made by his
colleague Ivan Rudolf who probably accompanied him on most of his explora-
tions. Rudolf was born near Idrija in 1821 and became an engineer, first at
the mercury mines there and then at Rablj. His name is commemorated in the
Rudolf Chamber at Skočjanjska Jama and Rudolf’s Passage in Plitvice.
The published surveys (47, 2, plates 2, 7, 10) show 8960 m in Postojnka jama,
6000 m in Plitvice, 493 m in Crna jama (with he actually Magdalena Grotte or
Navajo and others has done before), and also 1996 m in Predjamska jama. The
Postojna plan was also printed again at a smaller scale superimposed in col-
our on a relief map of the ground above so as to relate the cave to the surface
topography (47, 2, plate 1). Many of the other caves in the district have been
surveyed by Rudolf, or at least measured, for Schmidl (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
1872, and several of them were enlarged later by their subsequent discoveries.
Schmidl’s concern with underground hydrology as a useful product of cave ex-
ploration has already been mentioned in the case of the Timavo water-sinking at
Skočjanjska Jama. He was interested too in the origins of the two streams which
merge underground in the Plitvica cave, though here he was only partly cor-
rect. A proportion of the underground water from the Cerknica Lake and the
river Rak flows direct to the eastern source of the Timavo (the river which rises
principally at Plitvica) without appearing in the Plitvica cave; at all Schmidl
(47, p. 153) was the first person to appreciate this and it probably influenced
him in his incorrect belief that none of the Plitvica water comes from Cerkni-
ca. In fact most of the water from here does flow, via the Rakov Skocjan polje,
to join the Postojna water inside the Plitvica cave, whence they emerge to-
gether in the western source of the Unica. The actual junction of these two
streams underground had been known since 1748 or before but their origins
remained in arrière for many years. Father Anton Urbas (1849) supposed cor-
rectly in 1848 that the south branch was fed from Cerknica and the west one
from Postojna. Schmidl (47), on the other hand, considered that it was the
south branch which received the Pinta river, while the other one drained the Kishenfeld plateau to the west.

Although Schmidt's exploration of caves and his accurate recording of them account for a large degree for 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 are largely taken for use in cave fauna studies; later, together with the 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° to 15.4°C, while inside it remained between 6.8° and 7.0°C (47, p. 177). 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 Lechida near Szilvize attracted particular attention (49, p. 614-616).

The mechanism of cave formation evidently did not interest Schmidt 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 Schmidt (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" (Cvijič, 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 specialist subject in Schmidt's time. He undertook very little original research in this himself, though some of his water temperature measurements were made in connection with studies on Pteron uranipilos (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 Schinzer (1854) on cave fauna and by Pocock (1854) on cave flora. Zippe (1855) contributed a section on geological and palaeontological aspects.

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

Schmidt'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 sur-
vaying, 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 his separately published book: *Die Grotten und Höhlen von Adesthore, Lucay, Palestine and Lauen*. The closely written text, generally descriptive, gives full summaries of previous work and a separate volume of large format contains the plates and also shows 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 Heiligenkunde des Karstes*. This intention was never realized, overtaken perhaps by Schmidt's new duties in Budapest after 1857.

Mattel himself spoke very highly of this book. It almost be considered as the first of its type, and its author as the real originator of speleology or the scientific study of caves (Mattel, 1894, p. 435). Again, it is written in the style of the *Département de la Spéléologie* (Mattel, 1863-66, p. 3).

Mention of Mattel 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 state 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 with caves for some seven years; Mattel's period of active 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 Mattel's, while predominantly in France, ranged also into all parts of Europe as well as Russia and America. Schmidt's main published writings on caves amount to 3 books and several dozen papers, while Mattel produced some 20 books and 780 papers, many of them translated and published abroad. The speleological societies set up in America from 1879 onwards may owe something to Schmidt's influence. Mattel himself founded the Société de Spéléologie in 1853, which had a significant international function.

This is not to say necessarily that Mattel 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, coupled 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 it did so exist is undoubtedly due in some measure to the influence of Schmidt's activities 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.

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SUMMARY

A. Adolf Schmid (1820-1881) was the first person to regard palaeontology as a single coherent subject. Besides making important new explorations, he studied both hydrology and underground morphology and was also closely concerned with the work of other scientists and firms. His publications ensured that his achievements were known to his century, but his influence was felt subsequently far beyond the sphere of Menzel who nevertheless called him one of the inventors of palaeontological

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