

The Great Age of the *Taschenmikroskop*

Part IV:

Decline and lasting influence (Continued from Issue 191: October 2011)

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Introduction

In the previous parts of this series on "The Great Age of the *Taschenmikroskop*", we surveyed the historical, social and economic background and evolution of the *taschenmikroskop* phenomenon of the 1920s and early 1930s. We started this series with the relatively basic and inexpensive examples in [Part I](#)ⁱ, through the more capable and expensive *taschenmikroskops* presented in [Part II](#)ⁱⁱ, to the high-end, elaborate and highly capable portable microscopes introduced in [Part III](#)ⁱⁱⁱ.

In this last section, Part IV, we discuss three results derived from the *taschenmikroskop* concept, which, as noted previously, was primarily a German phenomenon of the 1920s and early 1930s. The first is the influence of the *taschenmikroskop* trend on other contemporaneous makers outside Germany. The second discusses the attempts made after World War II to revitalize the concept or divert it in other directions. Lastly, we present our conclusions on the reasons for the demise of the *taschenmikroskop* concept in the context of post-war technological and economic realities.

I. Responses to the *Taschenmikroskop*

As we saw in [Part I](#)^{iv}, the introduction of the *taschenmikroskop* concept by German optical makers derived from historical events, primarily, the economic situation in Germany, and the state of research and exploration between the two World Wars. This trend had impacts on microscope makers outside of Germany, who attempted to duplicate, often with modifications, some of the most innovative design features of the *taschenmikroskops*. Of the *taschenmikroskops*, the Tami "family" appears to have been, perhaps, the most influential, since it affected the development, although not significant production, of a series of small, portable microscopes made by some British manufacturers about the same time. Responses to the *taschenmikroskop* were also evident in the USA where some models, in particular the Model 40 by Bausch and Lomb, were launched in an attempt to challenge the German imports.

The German *taschenmikroskop* was made with a view to sales in overseas markets, and were quite successful there. There are many examples of this overseas thrust: the English inscription "Made in Germany" is frequently seen engraved on the japanned brass canister of the Spindler and Hoyer "Junior", and advertisements of the Goerz Lomara and Ultra-Lomara frequently, and for a while continuously, appeared in American scientific journals and popular scientific magazines. The success of the German makers can still be seen today where surviving Hensoldt Tami microscopes are offered for

sale on eBay by US and UK sellers, perhaps, more often than they're listed for sale on German eBay. So, it was only natural, at the time, that local manufacturers would attempt to compete with these imports by launching their own versions of the *taschenmikroskops*. These locally made microscopes were often less expensive, but no less capable.

The first three models presented below show examples derived almost directly from the *taschenmikroskops* discussed earlier in this series. The first two are, in fact, “continental” versions of the Hensoldt Tami, whereas the third model resembles in some details the Leitz “Minor”.

The microscopes

Model Designation: Unknown.

Manufacturer: C. Baker

Location: London

Production Year: Around 1925, duration of the production is unknown.

This is a relatively less finely-made copy of the Hensoldt Tami, but set on a more convenient continental stand. It was manufactured by C. Baker of 244 High Holborn Street, London. The firm was active from 1855 to 1959 and the microscope can be dated to the mid-1920s, through, perhaps, the early 30s. This microscope appeared in advertisements in 1925 London newspapers, which allows for approximate dating. Although it looks clumsier than the Hensoldt Tami, and was made of less expensive materials, the optical quality is high. However, its field of view is rather narrow (850μ at 100X). Its relatively large stage for this category, 62x55 mm, enabled the convenient use of standard RMS slides. The use of RMS slide sizes was difficult on many German *taschenmikroskops*.

Baker has an extended history of developing and marketing portable microscopes, e.g., see our paper on Baker's Traveller's microscopes^v.

Dimensions: Weight: 663 gr. Height: 245 mm with the draw tube fully extended; 155 mm when closed.



Figure 1. Baker c. 1925

Model Designation: Unnamed.

Manufacturer and location: Unsigned, but style and purchase location suggest a British origin.

Production Years: Most likely c. 1925-1929.



This is a version of the Tami but with a well-made solid cast iron stand. The draw-tube is marked with the magnifications, which are similar to those of the original Tami but are less detailed. The knurled helical screw focusing is also identical to that of the Tami. The optical quality seems to be lower than that of the original German microscope, but it is still useable.

Although the heavy stand more than doubles the weight of the microscope relatively to the Hensoldt "Tami" and eliminates the possibility of using the sturdy protective cap, it solves two of the main disadvantages of the original Tami design: (1) its excessive lightness, resulting in instability in use, and (2) the requirement for vertical viewing, making it quite fatiguing for continuous, extended use. The stage here, as with the Baker, is relatively large in comparison to the other microscopes in the category, 63x50 mm, again enabling the convenient use of standard RMS slides. While it still features the inconvenient Tami focusing mechanism, we found this anonymous pocket microscope to be one of the most convenient in its category.

The optical quality is reasonable, although the field is rather curved. However, this microscope supplies a significantly wide field of view, 1200 μ at 100X.

Dimensions: Weight: 1015.3. Height: 270mm with the draw tube fully extended, 170mm when closed.

Figure 2. Unnamed c. 1925-1929

Model Designation: Pocket Microscope No. 40.

Manufacturer: Bausch & Lomb

Location: Rochester, NY, USA

Production Year: Early to mid-1920s.

The microscope is constructed entirely of brass with the main body having a black enameled surface finish and the tube and draw-tube having a nickel plated surface finish. The original lacquered brass B&L objective is divisible and is marked 8-16. Depending on the setting of the draw-tube, and the lenses used with the objective, this microscope gives magnifications in the range of 60-250X^{vi}. The materials, construction and size resemble the Leitz "Minor".

The microscope comes in a 127 x 58 x 69.8 mm cloth covered wooden case, lined in purple plush. The microscope falls into that small category of field instruments, similar to the Leitz "Minor", that have a mirror that can be removed and repositioned as needed to provide incident or transmitted light. The rear tripod leg, with its "V" shape is somewhat reminiscent of the rear leg of Swift's all brass folding tripod microscope of the last century.

Dimensions: Weight: 663 gr. Height: 245 mm with the draw tube fully extended, 155 mm when closed.



Figure 3. Bausch and Lomb Model 40

II. Post-WWII attempts to revive the *Taschenmikroskop*

In the years that followed World War II, sporadic attempts were made by some companies to restore the glory of the "*taschenmikroskop* decade". However, these efforts were usually non-productive for several reasons, which will be discussed in the last section of this article.

During the 1950s, most of the production of small microscopes was divided between instruments intended for use by serious amateurs and scientists, or to school and shop inspection microscopes. The focus on professional field instruments was quickly captured by the invention of the folded optics microscopes of the McArthur-type. The McArthur microscope and its descendants represented an entirely new, and markedly different, concept. They developed outside the confines of the *taschenmikroskop* phenomenon and were their major competitors.

The few post-war microscopes presented here are reminders of the glory days of the pre-war "*taschenmikroskop* decade", although usually not as finely made or produced with the same high quality

materials. The first two examples, by German speaking companies, represent attempts to restore pre-war design goals, while the last two stands are modifications of the *taschenmikroskop* concept to the production of school microscopes.

The microscopes

Model Designation: “Tami”.

Manufacturer: Zeiss-Hensoldt

Location: Wetzlar, West Germany

Production Year: 1950s.

Under the brand-name Tami, or in Tami-like shapes, several types of pocket microscopes were still produced during the years that followed World War II. These microscopes were improved versions of the original Tami design of the 1920s, having the same saltshaker-like housing but made of modern materials and technically improved. The brass and nickel-plated brass of the original model, is replaced by aluminum alloys, chrome and Bakelite in these post-war models. These instruments are

not commonly for sale, and we assume that they were not manufactured in great numbers. A major improvement was made to overcome one of the main disadvantages of the original Tami by including a compass joint in the stand, enabling the tilting of the microscope when the cap is removed.

Two types of microscopes were made. One is a transmitted light microscope similar to the original Tami, but like the Metami and the Protami it was equipped with a stage, substage condenser, and a pivoted mirror. Like the original Tami, magnifications were still changed by a draw tube and focusing was made by a rotatable knurled collar. The other model, displayed here, is an inspection microscope of fixed (40X) magnification having a detailed micrometer eyepiece. The optical quality of this microscope is exceptionally good and the field of view is very wide, 4.1 mm at 40X.

Model Designation: Unknown.

Manufacturer: Reichert

Location: Wien, Austria

Production Year: 1948-53.



Figure 4. Hensoldt “Tami” inspection microscope

This is a lightweight (245 gr.) single-pillar pocket microscope made almost entirely of aluminum. Many details of it resemble features of pre-war *taschenmikroskopes*, but the overall construction and finish are Spartan. The tube is of RMS diameter, enabling the use of a wide variety of oculars. The specimen displayed here came with a simple cardboard box with an inner compartment for a spare ocular, and with original Reichert 10X and 16X oculars. The tiny nickel-bronze turret includes three midget objectives of 2,5:1, 6,3:1, and 10:1. Together with the optional oculars, this setting enables a rather significant range of magnifications. The optical quality is reasonable but not, in the authors' opinions, up to usual Reichert standards.

Although we could not find any references to production of this model, our general impression is that it was made in relatively small numbers, judging by its current availability for direct sale or in auctions. This indication, though far from being scientifically based, stands in stark contrast to the high frequency of sales for models such as Spindler & Hoyer "Junior" and Hensoldt "Tami".

Model Designation: "Kleinmikroskop B".

Manufacturer: ROW

Location: Rathenow, East Germany

Production Year: 1950-65.



Figure 5. Reichert pocket microscope



Figure 6. ROW Rathenow Kleinmikroskop B

This model, named "Kleinmikroskop B", in English "small microscope B", may be considered the "Trabant" of microscopes (after a VEB East German auto maker's most ubiquitous, but mediocre car). It was produced in the 1950s in the East German town of Rathenow at the time of the *Deutsche Demokratische Republik (DDR)*. Instruments of this type were produced until 1965, when they were replaced by another model of low-cost microscope with draw-tube, which is being produced in Rathenow today^{vii}.

The city of Rathenow has a long tradition of optical manufacture. It began in the 18th century with Johann Heinrich August Duncker, who studied optics and lens grinding in Halle, Germany and started producing microscopes after his return to Rathenow, in about 1800. The prestigious company of "Busch Rathenow" produced high quality microscopes until World War II. After the war and under the Communist regime of the DDR, the company turned into a "VEB" (namely a company owned by the citizens) having the logo "ROW" (Rathenower Optische Werke). The microscope is primarily made of modern materials, Bakelite and aluminum, but the design is completely anachronistic. Many of its features were clearly inspired by various pre-war *taschenmikroskopes*. It has a sleeve and sliding-tube focusing typical of the 19th century, a two part combination button objective, typical of an earlier era, and the draw-tube for additional magnifications reminiscent of the Tami "family". It stands, perhaps, as the last of the old fashioned single-pillar microscope made in the second half of the 20th century. In this spirit, the instrument and the objective

have individual serial numbers, an unusual phenomenon for a school microscope. Fortunately, the optical quality is good for this category of microscope, preserving some of the lost glory of the pre-war days of this firm. A dovetail wooden box, another anachronistic feature for its time, is housing this peculiar but still lovely relic of the Spartan days of the DDR.



Figure 7. ROW Rathenow Kleinmikroskop B case

Model Designation: Unknown.

Manufacturer: C&D Hemel Hempstead
Location: Hemel Hempstead, Hertfordshire, U.K.
Production Year: 1950s.



Figure 8. C&D Hemel Hempstead field microscope

This field microscope, made by C & D of Hemel Hempstead (today: C and D Microservices Ltd), was designed for high school and university students. Many features in it were borrowed from the Tami “family”, including the telescopic draw-tubes and the helical focusing. The metal dome cap, though resembling the Tami, is also similar to that of larger field microscopes such as the Wild M11 and the Meopta Praha. The magnification range is around 80X-100X. The cast steel base has a swing out carrying handle, while the theodolite-like steel dome cover clips to the base to effectively protect the microscope during transit. The microscope is provided with a single lens, and substage mirror without condenser. However, it lacks the fit and finish of many of the pre-war *taschenmikroskops*.

Model Designation: Not applicable.

Retailers: Lafayette, Selsi, Micro, etc.

Location: Japan

Production Years: 20th century

A variety of almost identical tripod microscopes, following the style of the Spindler and Hoyer Junior, but without its protective outer case, were sold by Lafayette, Selsi, Micro and others. These small microscopes were made in Japan, and from their appearance were manufactured by the same Japanese company, with retailers adding their name to the outer surround of the eyepiece. The microscopes had removable screw-in legs, and the legs and microscope were stored in a soft-side zippered vinyl case, and sold in a cardboard box. These microscopes magnified from 20X to 80X depending on extension. They were, in the authors' opinions, of low optical quality. They were sold by a variety of retailers, and therefore are still commonly available today at very low prices.



Figure 9. Tripod microscopes inspired by the Spindler and Hoyer "Junior"

III. The Demise of the *Taschenmikroskop*

We began this article series with the assertion, that the emergence of the task-specified high quality pocket microscope was the result of a combination of political, social, economic and scientific circumstances. These combined set the limitations on German companies after World War I, the "microscope frenzy" of the late 19th and early 20th centuries, the rise of exploration and the birth of bacteriology and parasitology inspired by the works of scientists such as Robert Koch. It was this combination of conditions that led to the introduction of the German *taschenmikroskop*.

The reality after World War II was completely different. The optical microscope, which enjoyed popularity as the major scientific tool for over two centuries, was diminished by the invention of the electron microscope with its greatly extended performance. While frontline military hospitals in World War II, as well as in the Korean and Vietnam wars were using mostly larger field microscopes, travelling scientists were fascinated by the newer, though not necessarily more convenient, folded-optics microscopes. But what were the reasons for the neglect of these fine *taschenmikroskops*?

After reviewing the most significant models of *taschenmikroskop*, we can summarize the reasons, in our opinions, as follows:

- 1) Magnification power: many of the German pocket microscopes were very limited by their magnification power. The magnification required for the inspection of pathogens (bacteria,

malaria Plasmodium, etc.) is at least 400X, preferably 800X and higher. The magnification of most pocket microscopes was lower. The only models that met these greater magnification requirements were the quite expensive Protami and the Ultra-Lomara.

- 2) Price: the high-end German pocket microscopes were incredibly expensive. At the same time, for most scientists the major role for field portable microscopes was as a supporting tool for pre-lab fieldwork. This must have limited their demand considerably.
- 3) Ergonomics: several features of the *taschenmikroskops*, even their high-end models, made them very inconvenient for prolonged use in field conditions. For example, the annoying button objectives of the Ultra-Lomara, or the upright position of the Protami and others. Cheaper *taschenmikroskopes* were often more inconvenient in use, being too small, too lightweight, or too delicate for demanding operations in the field.

It is perhaps a "joke" of history that the same features that jeopardized the production of the *taschenmikroskop* as the preferred solution for the mobile scientist are now driving the development of folded optics microscopes, which in some applications have superseded more traditional instruments.

We will review the folded-optics instruments in a future series of articles. However, the McArthur microscopes (except for the very basic Open University model), the Nikon H, the Swift FM-31 and several other models that appeared in the market, are usually expensive and often very inconvenient for prolonged use. Perhaps the best folded-optics microscope of all time is the TWX-1. It was built for Chinese army field hospital use and so was available only in limited quantities, and not sold in the open market.

We are confident that in the realities of the 21st century, a fully capable, lightweight, and inexpensive copy of the excellent FM-31 folded-optics microscope^{viii} and/or the Protami (the *taschenmikroskop* of our choice) both can be produced and successfully replace some costly attempts to develop the next generation of cheap and effective health microscope for developing countries.

Be Careful out There

In earlier papers in this series we discussed a variety of *taschenmikroskops*, including the "Lomara" in Part II and the "Ultra-Lomara" in Part III. Before the publication of our articles we had purchased Lomaras and Ultra-Lomaras earlier in the year, for less than USD \$80 each.

In Part III we mentioned "the Ultra-Lomara is a far cry from the smaller and modest Lomara ... ". Last month, after the earlier Parts of our paper were published, a Lomara, *not* Ultra-Lomara, with a title beginning "1930 ULTRA RARE LOMARA ..." and with the listing describing it as "A VERY VERY HIGH END PRECISION TOOL..." sold on eBay US for \$400.

May we gently suggest that our papers be read carefully. Any listing being considered for a potential purchase, particularly if occurring shortly after one of our papers is published (discussing a particular microscope) be read with equal care and carefully considered.

Note: This is the last Part of a multi-part paper on *the Great Age of the Taschenmikroskop*.

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